MOTORAGE

Volume XXXVI

PUBLISHED WEEKLY AT THE MALLERS BUILDING CHICAGO, AUGUST 28, 1919

Fifteen Cents a Copy Three Dollars a Year

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97% of Our Product is Sold Through Men Whose Connection is More Than 6 Years

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Hudson Motor Car Company



Detroit, Michigan

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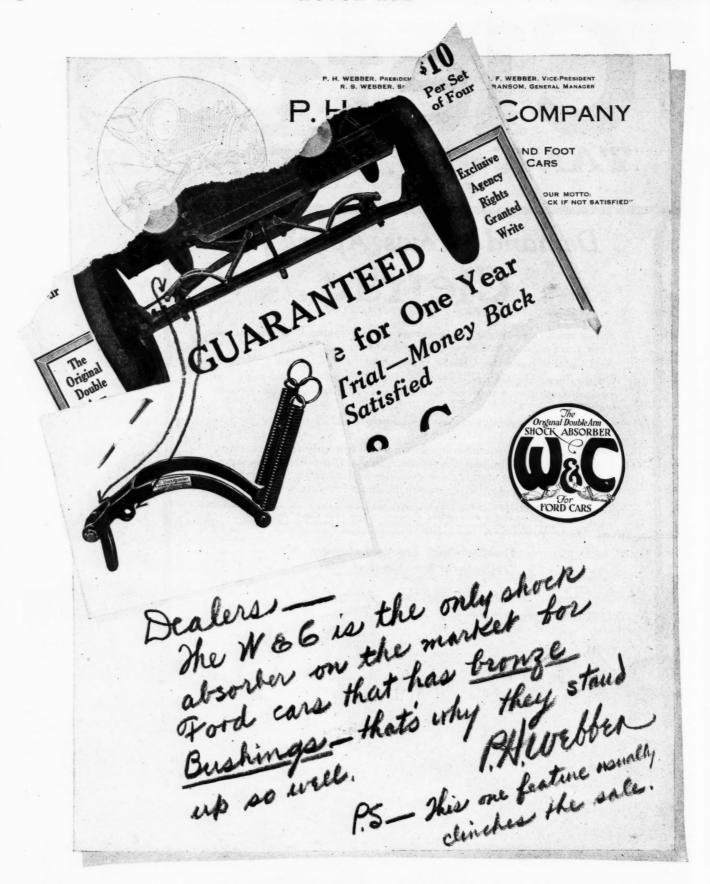
The Cletrac is the true all-purpose tractor—not only for the farmer, but for the road builder, the contractor, the industrial manager. It is the tractor that stands for more sales and more satisfied owners. It stands for a bigger, better tractor business for you.

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MOTOR AGE

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Phone Randolph 6960 Cable Address "Motage"

E. E. HAIGHT, Manager
DAVID BEECROFT DARWIN S. HATCH
Directing Editor Managing Editor

BRANCH OFFICES

DETROIT, 95 Fort St., W., Phone Main 1351

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Depressed footboardincreased leg room
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New Comforts With New Beauty

Seen from every angle the new Velie is strikingly attractive. Its



JIM ISN'T A FORTUNE TELLER—

But He's Planning for the Future

The other day we approached our friend Jim, who runs quite a large business. We asked him how he expected business to be next winter and, not taking us very seriously, he answered: "I can tell you about the past and present, but nix on that future stuff."

However, after a little of the funny side, Jim got to the serious side of things and admitted that he was giving the future most of his thoughts these days.

"Business is very good now, we're being rushed pretty much, but this particular busy season is soon coming to a close; however, you can bet your last dollar that Jim's place is going to be in the midst of a busy season when the snow is flying."

"I'm going after that Overhauling and Repairing and general maintenance business harder than ever and I'm making my plans right now, so when the curtain drops on the present season I'll be 'Johnny on the spot' for the next."

Jim is a wideawake progressive kind of a fellow and sort of dominates in his community—he's laying his plans for the future NOW. There'll be no cold-weather drop in his business curve.

How about you? "Been pretty busy and haven't given it a thought," you say. Well, it's not too late to start thinking about it now, is it?

MOTOR AGE is laying plans right now for some real live inspirational articles to help you go after the overhauling business in your community just as hard as Jim is going to go after his. We're getting together a great deal of valuable information from various sources and when we get through, we're going to put a lot of it in one big issue so you'll have a real reference guide that will help you to not only get your share of this business, but also show you how to do the jobs in a most thorough manner.

Jim offered us a couple of suggestions and wants our opinion on a few of his pet ideas. Perhaps you, too, have a few ideas in mind about this important subject or can offer some opinions on what you think this coming big number of MOTOR AGE ought to have for you and your fellow members in the automotive trade.

Shoot them along so we won't fail to cover everything that will bring a busy season next winter.

Ye Editor.

Significant Facts

about

WHITE TRUCKS

They have much the largest output in the high grade truck field.

They were the trucks with which transport units in the French Army won the Croix de Guerre.

They were adopted as the standard Class A Truck in the United States Army.

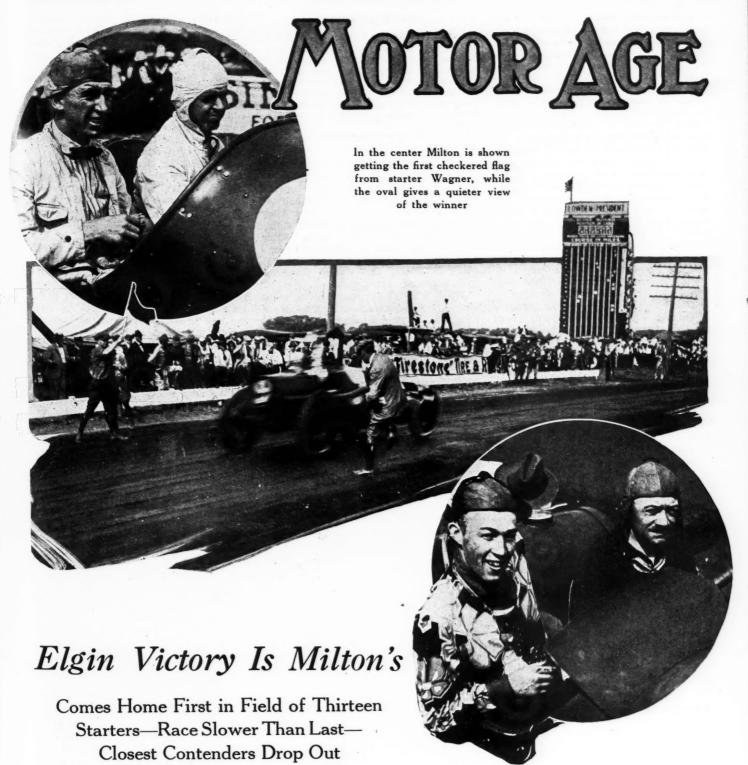
They have the largest fleet distribution in the United States. No other truck maker has ever approached the ROLL CALL of fleet owners published annually by The White Company.

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They have the lowest cost of operation and the highest percentage of days in active service, as far as shown in any comparative records known to this company.



THE WHITE COMPANY



The ornamental jacket of his mechanic adds color to Sarles' coming in second

By Darwin S. Hatch
Managing Editor Motor Age

E LGIN, ILL., Aug. 23—When Tom Milton tooled his eight-cylinder Duesenberg into first money at Elgin to-day, he scored the first win ever made for a Duesenberg car in an Elgin national road race. Duesenberg engines got the lion's share of the honors in to-day's event, placing first, second, fourth and fifth. The Duesenberg brothers, who have been staunch supporters of road racing since the early

days at Elgin, never had placed one of their cars in first money of the Elgin national, although the Masons, carrying their engines, won the Chicago Automobile Club trophy race several years ago. Milton, in capturing first place, completed the 301.84 miles in 4:5:27. This is an average speed of 73.9 m.p.h. and much slower than the time of the last Elgin race in 1915, when Gil Anderson piloted a Stutz over

the distance at an average of 77.25 m.p.h. If Milton had had competition during the latter part of the race, the track record might have been lowered.

Milton's car is the same one in which he won the Uniontown race a few weeks ago. It is an eight, with the cylinders all in a line like the Ballots which came over from France for the Indianapolis event. Roscoe Sarles took second, 25 min. behind Milton. His Roamer was followed across the tape by Ed Schillo in an old Mercer which had been campaigned for many years. Hitke, a team-mate of Sarles, got fifth place, and Ira Vail in a Philbrin placed fourth. This Philbrin is the Duesenberg Thurman drove at Indianapolis and is practically the same as at that time except for the use of Philbrin ignition.

Paul Harvey, a Chicago youngster, who, with Bob Burman's help, built the Ford Special which he piloted to a win in the amateur Ford race on the Chicago speedway, made his debut in big time by taking sixth place, although he was flagged before he completed his last lap. His car is the old Peugeot which had been driven by Bub Burman. Barney Oldfield's one-time Golden Egg, now with its shell removed and the Oldfield Special, was still running at the finish. It was driven by Stein. This was the seventh Elgin road race, and to-day's event revived a classic which has been under wartime suspension since the successful event of 1915, when the Stutz swept the cards. As in the last, the event was promoted by the Elgin Road Racing Association and managed by the Chicago Automobile Club. Attendance was not up to expectations but nevertheless was sufficient to make the affair a financially profitable one.

Had not both Ralph Mulford and Kline encountered Arthur engine trouble which put them out of the race when they were in the lead, the time would have been very much faster and probably would have set a new track record for the distance. At 150 miles, when the race was half over, Mulford was leading and had averaged 78.4 m.p.h. This is much faster than the distance had ever been negotiated in

the past.

most a duplicate of the one Milton drove to victory, was green. Work on it had been rushed to get it out from the factory in time for the race. Difficulties with lubrication, caused probably by clogged oil leads, froze up the eight-cylinder engine after Mulford had covered 155 miles. Strenuous work at the pits failed to get the engine started

ORDER OF FINISH

Car	Driver	Prize	Tim	. 1	LP.H.
Duesenberg	Milton	*\$4,000	4:05	:27	73.9
Roamer	Sarles	2,000	4:30	:07	67.08
Mercer	Schillo	1,000	4:41	:38	64.35
Philbrin	Vail	600	4:43	:20	63.98
Roamer	Hitke	400	4:41	:58	
Peugeot	Harvey	Plagged	l in	35th	lap
Oldfield	Stein	Plagged	l in	35th	lap

*Winner also gets Cobe trophy. †35 laps.

properly and Mulford had to withdraw. While Mulford was trying vainly to get under way, Arthur Kline in the Peugeot took the lead. Mulford had led until that time with Kline, Tom Alley in the Bender Special and Milton fighting for possession behind them. Kline held the lead until he began to experience oiling trouble, gave up his first place to Milton and finally withdrew with bearings burned out.

When Milton saw first place in sight and only Kline ahead of him, he drove like wild, turning off laps at exceptionally high speed. In fact, he set a new lap record for the course of 6 min. 14 sec. for one lap of 8.3844 miles, an average speed of 81.04 m.p.h. At the time of Kline's withdrawal Milton was half an hour ahead of anyone else and had it easy for the remainder of the race.

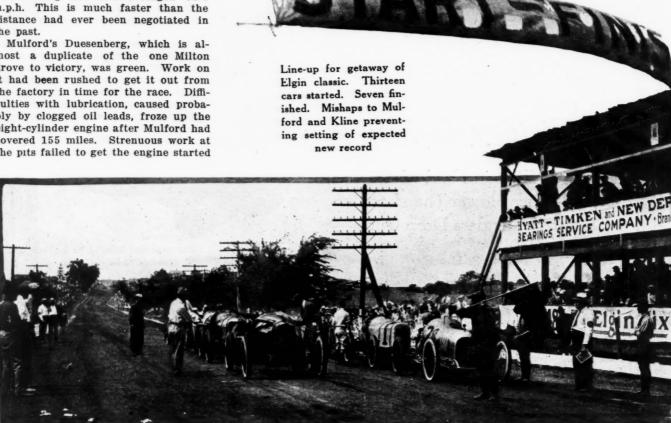
Alley had been a serious contender for more than half the race but had to withdraw on account of a broken water Alley's performance watched with special interest by the rail birds because his Bender Special was equipped with hydraulic brakes on all four wheels. The Peugeots had four-wheel brakes, but they were mechanically operated, whereas Alley's hydraulic brakes have a feature of complete equalization through the hydraulic pressure.

This gave him an advantage because he could approach the turns much more rapidly and pull down his speed in a hurry without danger of skidding. It was noticeable that whereas most of these drivers shut off some distance from the turn below the grandstand, Alley ran almost into the turn before shutting off. So far as could be told from the sidelines, Alley's brakes operated perfectly.

Thirteen cars started of the fifteen which were entered. Percy Ford's Haynes was eliminated the day before on account of engine trouble in practice, and some necessary parts for Whalen's Hudson failed to arrive in time for him to get away with the starting guns. While several drivers overran the turns, the banks of hay placed for their protection stopped them, and they all succeeded in getting back on the

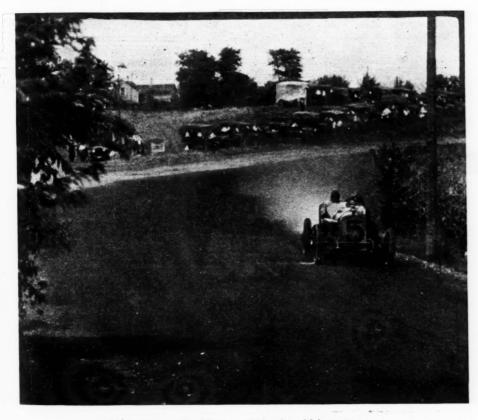
track without difficulty.

No serious accident marred the day's program, and only one accident of moment occurred, that resulting in no serious injury. Clifford Durant, the son of the president of General Motors, driving the Chevrolet special on his first lap, was struck in the head by a stone thrown by the car ahead of him.



EQUIPMENT OF CARS IN ELGIN ROAD RACE

						Valves							
Car	Driver	No. Cyl.	Bore &	Displace- ment	No.	Location	Cam- shaft	Ignition	Plugs	Carbu- reter	Tires	Tire Size	Wheel
Chevrolet	Durant	4	313x6 1/2	296.8	16	Head	One	Bosch	Splitdorf	Miller	Goodyear	32x4 ½ 33x5 34x4 ½	R-W
Duesenberg	Milton	8	3x5 ¼	298	16	Head	One	Delco	A-C	Miller	Goodyear	34x4 1/2	R-W
Duesenberg	Mulford	8	3x5 1/4	298	16	Head	One	Delco	A-C	Miller	Braender	00110	R-W
Roamer	Hitke	4	3 3/4 x 6 3/4	299	16	Horizontal	Dual	Bosch	A-C	Miller	Mason	33x5 35x5	R-W
Roamer	Sarles	4	3 3/4 x 6 3/4	299	16	Horizontal	Dual	Bosch	A-C	Miller	Mason	32x4 ½ 34x4 ½	R-W
Bender	Alley	4	3 5% x7	289	16	Head	One	Berling	A-C	Miller	Mason	32x4 1/2 32x4 1/2	R-W
Oldfield	Stein	4	3 5/8 x7	289	16	Head	One	Bosch	A-C	Miller	Oldfield	34x4 ½ 33x5	R-W
Ogren	Cotey	4	3 % x7	289	16	Head	One	Bosch	A-C	Miller	Firestone	32x4 1/2	Houk
Peugeot	Harvey	4	3 5% x7 1/4	299	16	Head	Dual	Bosch	A-C	Miller	loodyear	34x4 1/2	R-W
Philbrin	Vail	4	3 3/4 x 6 3/4	298.2	16	Head	Dual	Philbrin	A-C	Miller	Goodyear	32x4 1/2	R-W
Puegeot	Kline	4	3.6x6 5/8	274	16	Head	Dual	Bosch	K-L-G	Miller	Mason	32x4 1/2	R-W
Mercer	Thomas	4	3 7% x 6 3%	299	16	Head	One	Philbrin	A-C			33x5 32x4 ½	
		-			8	L-Head	One	Bosch		Miller Zenith		33x5 32x4 1/2	
Mercer	Schillo	4	3 3/4 x 6 3/4	298.2	1 8	L-Head	One	Doscii	Bosch	Duplex	Mason	32x4 1/2	R-W



Ed Schillo in the Mercer taking the old hairpin turn

The stone stunned him temporarily and his car left the road, rolled over along a barbed-wire fence and wound the wire about itself like a reel. Durant and his mechanic, E. C. Comer, both were scratched by the wire, and Durant was bruised by the stone, but both were about in a short time. Except for a bent steering gear, the car was uninjured.

The track was in fair condition, but there were soft spots in it which grew worse as the race progressed, so that at times the cars swerved dangerously. In making the turn leading into the home stretch Vail lost control of his Philbrin temporarily, and the car shot from one side of the road to the other, being righted only after he had averted death by a few inches. This was Vail's first attempt at road racing, and the strain of the stiff turns at high speed on a course that was none too smooth proved too much for him. The strain on the car was so great Vail had to stop for 3 min. while pit men tightened the body bolts on his car and also tightened up the steering gear. Vail

all but collapsed and was relieved by Longchamp. Mulford got back into the race before it was over by relieving Longchamp for the last few laps and early editions gave Mulford the credit of placing the Philbrin.

Thomas Out in Third

After Durant's car had met with this accident, other cars began to drop out. Joe Thomas laid up his Mercer in the third lap with a burned-out bearing, and Al Cotey in an Ogren withdrew in the fifth lap with a broken connecting rod.

Several of the drivers complained of vandalism. Before the race it was discovered the course had been sprinkled liberally with large tacks, and this seemed to be confirmed when many tires had to be changed because they had picked up large roofing tacks. At least half the tires were changed, not because they were flat but because they had picked up these tacks, which seemed to have been maliciously distributed on the course.

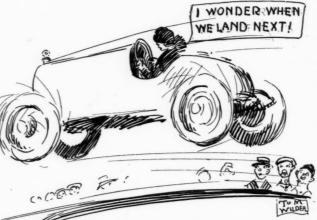
The timing was not up to the Elgin standard, and the results as given out immediately after the finish were changed by the official re-check of the tape. The proper facilities were not present for having accurate results immediately, although they did provide for giving the correct results when the opportunity came to check them. This resulted in placing Schillo in sixth place instead of in third in the early announcements of the result.

The course was exceptionally well patrolled by the militia, and the operation of the scoreboard, while not always in step with the race, was sufficiently close to keep the spectators informed most of the time as to the general standing of the drivers. There was not the close connection between times and scoreboards that there should have been.





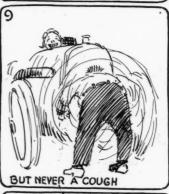
Mulford, Duesenberg and Oldfield in One-Reel Thriller Entitled "Starting the Duesenberg"

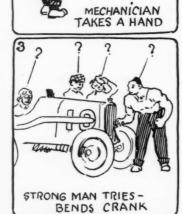


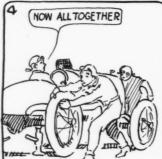




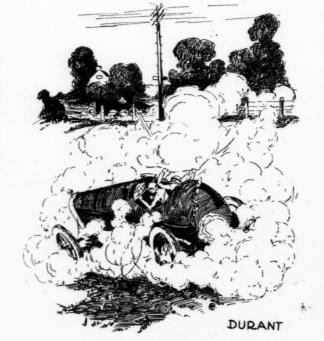


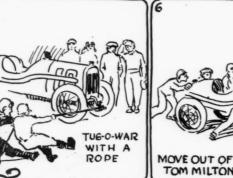


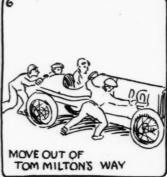
















The Race From the Pits

E LGIN, Ill., August 23—This year's Elgin race drove the last nail home in the argument that racing cars must come down to a smaller piston displacement. Like the cars at Indianapolis Memorial Day, the cars that competed at Elgin were altogether too fast for the course. With 183-cu. in. cars and necessarily greater strides in development of race car engines, it is safe to predict future races will be just as fast or faster and the cars will hang together better. The Elgin track was very rough this year, but that is not alone responsible for the comparatively slow time for the thirtysix laps. After Mulford went out in the first half of the race Milton was slowed down with just enough speed to keep him safely in the lead. As it was he finished about 30 min. ahead of the second man.

Twenty-nine Pit Stops

A checking up on the pit stops shows that there were twenty-nine all told. Pit work was poor in some cases, while some of the drivers got excellent support from their helpers behind the track. Quite notable was the pit work of Harvey. Tires were changed on his Puegeot quite as fast as in the days of Bob Burman when he drove this car. In some of the pits where one could expect better support the showing was below what it should have been. When Mulford brought his Duesenberg to the pits and was to pour oil through the spark holes to loosen up the piston no funnel or, what would have been better, an oil gun was available. As it was, Mulford was obliged to take a piece of paper and roll it into the shape of a funnel. It would seem that where pits are equipped with nearly every other article likely to be needed an oil gun would have been in-

Considerable warning was necessary by the technical committee to keep other than the allowable number of men working on a car. Drivers kept telling their men to stay behind the track continually. The arrangement of the pits was not as neatly carried out as at some of the other races. Some of the cars carried a larger-sized tire on the rear, and in several instances the helpers handed the driver the wrong-sized tires.

All told, eighteen tires were changed at the pits, but a good share of these were changed only as a precautionary measure, someone having sprinkled the course liberally with bill poster tacks which many of the cars picked up. In several cases the cars were about ready to leave the pits when someone would discover a nail in one of the tires, and valuable seconds had to be lost while a new one was put on. Of the eighteen tires changed, however, six were right rears, seven left rears, three right fronts and two left fronts. This, of course, cannot be taken to show that the track was harder on the left rears, as some of By B. M. Ikert

Motor Age Editorial Staff

these were changed as a result of an embedded tack, as mentioned.

Plugs gave very little trouble, Hitke being the only man to have occasion to stop at the pits for this cause. Hitke seemed to have some trouble in his No. 1 cylinder, as the plug in that particular one had a strong inclination to foul. As a result of the rough track condition shock absorbers were shaken loose, and five drivers had to make stops to tighten them during the race. Vail in particular had difficulty in this respect, but another cause of Vail's trouble was a loose steering gear, which brought him to the pits in the fourteenth lap and again in the sixteenth lap. The other drivers who made shock absorber adjustments were Harvey, Schillo and Longchamp, the latter, however, having Vail's Philbrin.

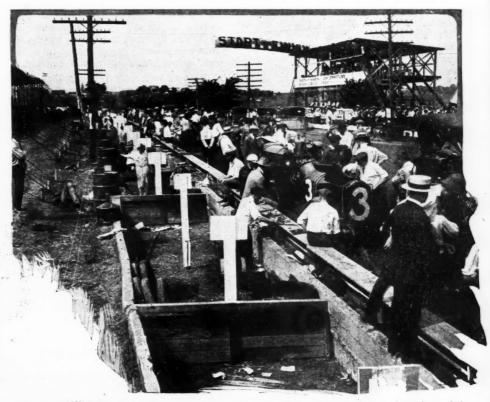
Engine trouble was present in large quantities. Alley was the first to come in, with his radiator steaming in a manner that would have done justice to Old Faithful. Alley, who had been putting up a beautiful race early in the day, came in on his fifteenth lap for a left front tire, probably punctured by a nail. Again on the sixteenth lap Alley came in for a right rear and right front tire, gasoline and water. He was losing water and spent about 8 min. taping his water connection. On his seventeenth lap Alley withdrew, as his engine was running hot. Just what the trouble was could not be

ascertained without dismantling the job. Alley seemed to have the best road car on the course, as was evident by watching him going down the home stretch.

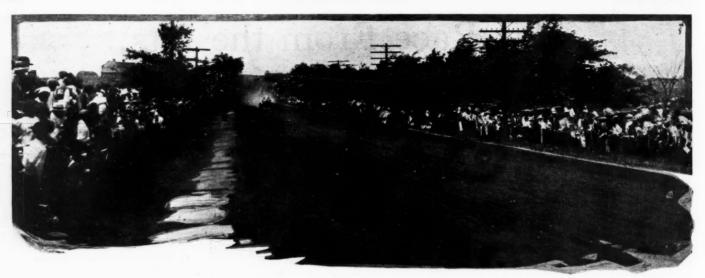
The first stop of the race was made by Hitke in the Roamer. He came in on his second lap and stopped 2 min., 30 sec. to change plugs. Three minutes after him Harvey drove his Puegeot in for a right rear tire, which was put on in 40 sec. On his ninth lap Waldo Steir. in the Oldfield Special stopped for a right rear and left front. He also changed a spark plug that had a cracked porcelain The fourth man to come in was Vail, who spent 15 sec. at the pits to tighten his shock absorbers. Three minutes after him Alley came in for his first stop and on his next lap stopped again, finally withdrawing on the seventeenth.

It was quite evident Vail was having steering trouble and he came in on his sixteenth lap for an inspection. There was considerable play in the steering gear, but he went on. However, he came in again on his seventeenth lap, with his arms so cramped he could not go on. The play in the gear was taken up, and Ernie Longchamp took the wheel. He also had to come back to the pits on the nineteenth lap to tighten the steering apparatus and shock absorbers.

Stein came in on his fourteenth lap for right front tire and gasoline. Kline made his first stop in his nineteenth lap for gasoline and a left front tire. Harvey came in shortly after this, also for a tire, a right rear. Hitke drove up for a left



Looking west along the pits, press stand on right and grandstand on left



This is Mulford's car in the foreground, coming along the stretch between the grandstand and first turn

rear on his seventeenth lap and came in again on his twentieth lap to change plugs, take on gasoline and strap a spare tire to the car. Again on his twenty-first lap Hitke stopped with engine trouble. This was traced to too high a float level, caused by the loss of a cotter pin in the float valve mechanism.

Mulford Meets Trouble

Mulford, who had been driving the Duesenberg at a record clip, came into the pits on his twenty-second lap with engine trouble. This engine was new and run for the first time in a race at Elgin. Although Mulford stated he had had plenty of oil pressure, it seemed the pistons seized and scored the cylinders. Oil was introduced through the plug openings and, after considerable time spent in turning the engine over, it became limber enough to warrant its running again. However, after it finally got going, August Duesenberg told Mulford to shut down as there was a pronounced knock in the engine and it would have been foolhardy to go on. Mulford stated the trouble was showing itself on the preceding lap but he hoped it would disappear. However, the next time around he was forced to stop. Mulford's engine was just out of the factory and consequently not in the best of shape for a race. Milton's engine has been run for a much longer period, which fact was apparent when it becomes known that he set the fastest time for one lap and the terrific speed his mount had. If he had had competition, it is very likely that the track record may have been broken for the 301 miles.

Milton made his first stop on his twenty-eighty lap, coming in for a left rear tire and gasoline, which lost him 2 min., 10 sec. His second and last pit stop was made in the thirty-third lap, after his pit men had been trying to flag him for fuel. He filled his tank and was away in less than a minute. The Philbrin driven by Longchamp was performing in good shape, but its driver, noting Mulford marooned at the pits for good, brought the car into the pits on its twenty-eighth lap and suggested that Mulford take the wheel. This Mulford

readily did, and from then on the Philbrin was driven at a merry clip.

Sarles in the Roamer Special drove twenty-two laps before coming into the pits for gasoline, water and right rear tire. Again on his twenty-ninth lap Sarles stopped for water and oil. These were his only stops. His pit work was quite good, and he continually cautioned his men to take things easy. Sarles' handling of the Roamer on the Elgin track and his direction of pit work branded him an excellent performer in road events.

Durant, of course, never came into his pit, as his accident occurred on his first round. Inspection of the car later showed that only the steering wheel was bent and the front axle moved back about 3 in. on the right spring from its normal position. The car was driven to the pits by his mechanic. Durant was the first to go out, but he was followed shortly by Thomas in a Mercer, who burned out a rod bearing.

The seventeenth lap saw Alley out, and a later inspection showed a broken water pump had caused his overheating trouble. Previous to him Cotey was put out of the running with a broken connecting rod. Art Kline after putting up a brilliant race had to retire the Puegeot in the thirty-first lap with a burned-out connecting rod bearing. In spite of the fact that many claimed the track surface rough, the eliminations of the cars shows that other causes were responsible. For instance, burned-out bearings cannot be attributed to a rough track surface, although the latter may have been partly responsible for the loosening of Vail's steering column.

All the cars were fitted with Hartford shock absorbers and used Sinclair gasoline.

From the Sidelines

Evidently in the four years intervening since the last Elgin race the promoters have lost the art of putting a race over so it will appeal to the crowd. While

today's race was probably as good a financial success as any of the previous races and assures next year's race, it is hoped that different methods will be used in managing the 1920 race.

Promptly at 12 o'clock the first car was sent away by Starter Wagner. He didn't even give the man, handling the Warner electric timing instruments, the required 2 min. grace to make the final adjustments, consequently the race was timed by hand. And they got it gloriously balled up so far as first announcements of results were concerned. Simply because they had no one to check up immediately the laps completed by the different starters.

When the race had finished it was generally thought by everyone, including the timers, that Hitke's Roamer had won third place, but 24 hrs. afterwards it was discovered that Schillo's Mercer had run thirty-seven laps in place of the required 36. This exploded the announced order of finish, as Schillo nosed out Hitke by a scant 20 sec. And now, with visions of lost dollars, it is someone's job to pacify Hitke and Vail, both of whom are shoved down a notch by the poor timing methods.

Durant left the starting line at 12:04 o'clock, and at 12:05 his car was lying on its side at Hoornbeek's turn, yet the lines of communication were so poor that even the judges stand did not know just what had happened to him until far after 1 o'clock. This same fact held true throughout the race, as it was almost impossible to get news from other distant parts of the course as to what had happened to cars that failed to pass the starting line at the expected time.

A little after 1 o'clock, Mulford, who was leading the field in an eight-cylinder Duesenberg, completed his tenth lap. Shortly afterward the announcer informed the crowd Mulford had finished ten laps in 1:04:29. It sounded nice, but didn't mean anything. Just what

(Concluded on page 30)

Dealer Protection in Prohibition Bill

Rights in Car Sold on Conditional Bill Guarded by Work of N. A. D. A.

S T. LOUIS, MO., Aug. 25—It is expected that dealers will be saved hundreds of cars and thousands of dollars by the amendment to the Volstead prohibition bill made by the Senate Judiciary Committee at the request of the N. A. D. A. Representations that conditional bills of sales and mortgages held by the dealer on cars should be respected to protect the equity of the dealer were adopted by the committee, and there seems little doubt but this feature will go through.

In the first draft of the Volstead bill, which is the act to enforce prohibition effective Jan. 20, 1920, a car was subject to .confiscation for carrying liquor. Under the amendment if a car is seized the dealer may appear as a claimant and, if he proves the car was used wrongfully without his knowledge, may have his rights in the car protected.

In obtaining these rights the N. A. D. A. has the consent of the committee for the claimant to furnish a corporate bond for the value of the car pending disposition of the hearing. At first the committee proposed to require a personal surety bond. It was explained that thousands of dealers furnish corporate bonds for all their commercial transactions and it would inconvenience them greatly to go outside their regular channels to obtain the personal bonds, so the bill was amended to allow the court to adjudge what would be a "sufficient" bond.

If the officer refuses unreasonably to accept the bond offered, mandamus is available to compel acceptance. Also the court may designate what information it shall consider sufficient as showing cause why a seized car should not be sold. The committee is of the opinion the proper affidavits will furnish

sufficient protection.

Amplification was obtained of the method of giving notice of the seizure and proposed sale of cars. Section 26 provides that if no one is found claiming ownership of the seized car, a description will be advertised once a week for two weeks and if no claimant shall appear within ten days after the last publication of the advertisement the property shall be sold. The association obtained the further amendment of this clause by having inserted the following provision, "a copy of said advertisement to be mailed to the manufacturer of said vehicle if known." This is expected to enable the maker to notify the dealer of the seizure of the car and, if sold on a condition bill of sale, to allow him to appear as claimant.

The dealer must prove to the satisfaction of the court he has acted in good faith and has had no knowledge of the wrong-doing and did not act so negligently as to permit illegal uses. The association feel that no such conditions will arise under the constitutional prohibition as to subject dealers to loss of cars seized as now prevails under a statute which has been interpreted in the southern United States circuit courts to make the dealer the guarantor of the integrity of every man to whom he sells a car.

The amendments were obtained as a result of conferences between Harry G. Moock, business manager of the N. A. D. A.; C. A. Vane, St. Louis attorney, and Walter B. Guy, Washington attorney for the association.

STANDING OF BRANCH AGENCIES

St. Louis, Mo., Aug. 25-Sales agencies and branch agencies separately incorporated from the maker's corporation for which they distribute are

placed on a parity for return of excise taxes with dealers who have no connection with the factory organization by Treasury Decision 2909 handed to the N. A. D. A. recently.

The Revenue Department previously held a sale by such an agency was a sale by the maker and as such the tax was due on the price paid by the owner instead of the price for which the maker sold it to a dealer not connected with it. As a consequence a branch house tax made the total price of the car higher than the dealer's price or reduced the branch house profit to less than the dealer's profit on the same

WARTIME SERVICE HOURS

Sioux City, Iowa, Aug. 23 - Sioux City storage battery service stations are going to stick by the wartime closing hours. In fact, they are going to go them one better. The short-hour day and closed Sundays have been so satisfactory that the service stations advertised that after Aug. 18 they would open at 8 a. m. and close at 5:30 p. m. with "positively" no Sunday service. The following service stations have agreed to the new arrangement: Sioux City Storage Battery Co., Vesta Battery Station, Tri-state Storage Battery Co., C. E. Turnbull, Storage Battery & Electric Works, Morningside Motor Co. and the Arthur Electric Service.

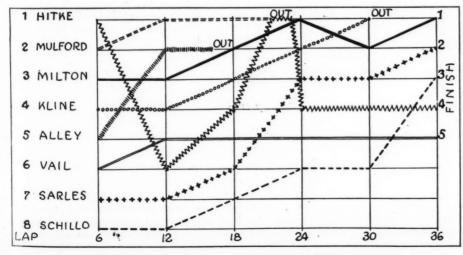
PEEK HEADS MOLINE PLOW

Moline, Ill., Aug. 22-George M. Peek will succeed Frank G. Allen as president and general manager of the Moline Plow Co., whose resignation becomes effective Sept. 1. Mr. Peek before the war was vice-president of Deere & Co. and during the war vice-chairman of the War Industries Board. Mr. Allen is retiring but will continue with the company in an advisory capacity until the first of the year. He also was formerly with Deere & Co., having been with them twenty-five years, most of that period as sales manager.

McCORD AND RUSSEL MERGE

Detroit, Aug. 23-The McCord Mfg. Co. and the Russel Motor Axle Co., two of the largest automotive concerns in the city, have merged into a new company. Stockholders of the Russel company will receive \$50 a share in cash, \$77.6 in 7 per cent preferred stock and half a share in McCord common stock in exchange for the transfer of \$750 .-000 of capital stock to McCord control.

The Russel Motor Axle Co. manufactures internal drive gears and axles for cars and trucks, while the McCord company is the largest producer of motor car radiators.



Standing of leaders every six laps of Elgin race



EDITORIAL



Lessons From Elgin

T HE Elgin race demonstrated that 300-cu. in. cars are too fast for the course, as all the really fast cars except the winner had succumbed to the terrific punishment before the race was three-fourths completed. From this it seems that the course will have to be resurfaced for next year's race.

S OME people are laboring under the impression that 183-cu. in. cars which will be used next year are going to be slower than the present 300-cu. in. cars. This is not true. Aircraft development has done much for high-speed engines, as some have been built that develop a horsepower for less than 1.5 cu. in. of displacement. Recently Peugeot in France has designed some remarkable racing engines of 3 liters that develop more than 100 hp. and have a road speed in a car of about 105 m.p.h. There is no reason why American engineers cannot equal this performance, as our aircraft engines are just as good as those produced by foreign engineers. We can expect just as fast a race next year as

this, as the horsepower to car weight ratio is not going to change materially.

R EGARDLESS of where road races are to be run, we know from experience the requirements are a hard-surfaced smooth course with safe turns. A soft course makes a poor race and a dangerous one from the spectators' side. Durant's accident, which fortunately was not as serious as it might have been, was attributed to loose surfacing material on the Hoornbeek turn. Let's cash in on this year's experience and have a good hard-finished course for next year's classic.

T HE performance of Schillo's Mercer proves the course was not what it should have been. The Mercer was not what we would call an extremely fast racing car, yet it was the most consistent performer in the race because its speed and that of the course were about the same.

Servicing the Owner

S ERVICE begins at the factory and it is a wise maker who recognize that fact. Especially is this true of truck service. Incidentally it is becoming more true, if such an expression is in order, of the motor car. Now comes the F-W-D with a plan based on the axiom that satisfactory results from the operation of any truck can be obtained only when that truck is understood thoroughly and proceeds to show the owner in every way possible what to do and what not to do.

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O FTEN nothing teaches so well as pictures, and this maker has prepared a series of posters which contrast the right and the wrong methods of adjusting and replacing parts. These are mailed to all owners periodically. One bears the heading, "This truck was out of commission for two days," and a picture is shown of a man who removed the engine from under the seat frame to put in new piston rings, whereas the piston could be removed

without taking out the cylinder. The poster then tells how to do the job in 2 hr. and illustrates the proper method.

T HESE posters are designed for hanging in the garage. For the average owner must depend on the men who work for him to operate and repair his trucks. The factory finds that to educate the owner is not enough. The owner will not take the time to digest lengthy information from the factory to pass it on to his drivers. A poster, however, such as used here, can be grasped instantly and, hung on the wall, is a constant reminder.

S UCH a plan well might be duplicated. A whole series would cover lubrication, careless driving, lack of mechanical knowledge, etc., showing in each case the result of the wrong way and how it could have been avoided. Meanwhile this concern is not only servicing the owner but servicing itself through the direct and indirect benefits to be gained in future sales and reputation.

Everybody a Booster

S OME day every car owner in the country and every dealer is going to get behind the good roads movement and the highways will take such a step forward in improvement as never has been dreamed of. Good roads have not kept pace with the growth in the number of motor cars and trucks. Iowa, for instance, has a car for every seven persons but only 1 mile of improved road for every 1400 cars.

M. M.

I OWA is going after more good roads for her people and the Government is going to help by Federal appropriations. But it will take every one of those who together

own one car for every seven persons to get even as good a ratio as 1 mile of improved road for every seven cars.

N. N.

OWA is not alone in her situation. We all know highway work has not advanced as it should. With the demand for cars constantly increasing and showing no sign of abatement, at least while the present status of production prevails, there is going to be even greater need for good roads. Let it be hoped that another late summer will find us better prepared for winter—with more year-round roads in proportion to our needs.

Studying Oil Situation

Automotive and Gas Joint Committee Launches Co-ordination of Industries

Support of Various Organizations Is Pledged

N EW YORK, Aug. 23—The first step for co-ordination of the automotive and the fuel industries was taken here the night of Aug. 21 at a joint meeting and dinner of representatives of national association of the two lines, with John N. Willys as chairman of the motor representatives. Discussions brought about statements of problems of productions, both of gas and of cars, that will result in later technical studies in an effort to solve the problems that have arisen.

The meeting was the forerunner of what is expected to constitute a well-defined program of study and co-ordination. No such efforts previously have been made, each industry working entirely independently of the other and each having little particularized knowledge of the requirements or problems of the other. The meeting here resulted in pledging the support of the various organizations involved, with their technical laboratories and equipment offered for a combined research for assuring future supplies and for utilizing this supply most efficiently and satisfactorily.

Associations Represented

The associations participating were, for the gas industry, the American Petroleum Institute and, for the automotive industry, the Society of Automotive Industries, the National Automobile Chamber of Commerce and Motor and Accessory Manufacturers' Association. The oil men present were Henry L. Doherty, Henry L. Doherty & Co., who acted as chairman of that section; Dr. William M. Burton of the Standard Oil Co. of Indiana; R. B. Leonard of the Atlantic Refining Co.; Frank Howard and B. M. Clark of the Standard Oil Co. of New Jersey, and R. L. Welch and C. C. Smith, general secretary and assistant general secretary of the petroleum institute.

The automotive representatives were. in addition to Mr. Willys, K. W. Zimmerschied, assistant to the president of General Motors; Coker F. Clarkson and Herbert Chase, general manager and assistant secretary of the Society of Automotive Engineers; Alfred Reeves, general manager of the N. A. C. C.; M. L. Heminway, general manager of the accessory association; Walter C. Baker and John G. Utz, Standard Parts Co., and F. C. Mock, Stromberg Motor Devices Co.

Mr. Clarkson stated that much research was yet necessary to determine fully the problems of engine combustion but added that present information indicated a further study would enable the production of a satisfactory engine fuel by cutting deeper into the crude oil than is at present possible. Fuel specifications were discussed, but speakers agreed that a fixed specification would be detrimental both to producer and consumer. A flexible specification was asked that might be changed as exigencies of the fuel supply and demand might demand. This, it was declared, would permit the automotive manufacturer to design his product in a manner that would utilize the fuel most satisfactorily.

Further work that will be done by the joint body was expected to take the study along more specific lines. The next meeting date was not fixed.

WILLYS CONTROLS DUESENBERG

New York, Aug. 22-That the Duesenberg Motor Corp. is one of the subsidiaries of the new Willys Corp. is now known, and indications are the sixcylinder car designed by Willys-Overland will be produced at the Duesenberg plant at Elizabeth, N. J.

Production of the Willys Six in a factory outside of the Toledo plant of Willys-Overland already had been forecast but its location had not been given out previously. It is believed production will be under way shortly and that the car soon will be placed on the market.

Confirmation also has been obtained that the Electric Auto Light Co., Toledo, and the New Process Gear Co., Syracuse, also are units of the Willys

ROCHESTER TO MAKE DUESENBERG

New York, Aug. 22-Manufacturing and selling rights for the model G-3 four-cylinder engine of the Duesenberg Motors Corp. have been disposed of to the Rochester Motors Co., Inc., Rochester, N. Y. Production at the Rochester plant will be under way by Oct. 1, at the rate of about 150 engines a month.

This model was developed by Duesenberg early in 1918, but production was stopped because of war work. It develops about 75 hp, it is stated, but other details were not given out. Contracts for its use have been made by the companies manufacturing three motor cars, it is said.

The Rochester company, which will call the engine the Rochester-Duesenberg, was organized about fwenty years ago as the Rochester Electric Motors Co. but five years ago absorbed the Brownell Motor Co. and changed to the present name.

DELCO - LIGHT SALES CONVENTION

Dayton, Ohio, Aug. 23-More than 100 representatives of the Domestic Engineering Co., maker of Delco-Light, of the Pittsburgh, Philadelphia and Buffalo districts met in convention at Dayton, Ohio, during the last week. The principal topics of discussion included engineering, service, advertising and financing of the Delco-Light sales organization. The dealers were the guests of the company and several very interesting sessions were held.

L. Geyler Sues Hudson

Chicago Dealer Starts Action For \$800,000 Damages in Alleged Commissions

Interest in Decision on Value of Distributors' Contract

HICAGO, Aug. 22-Louis Geyler, formerly distributer for Hudson and Essex in the Chicago territory, filed suit in the United States District Court in Detroit yesterday to recover \$800,-000 damages from the Hudson Motor Car Co. and Essex Motors. The Hudson Motor Co. of Illinois was made the distributer June 1. Geyler who had been the Hudson distributer nine years was notified that he was to lose the distribution of Hudson and Essex cars, the manufacturer taking advantage of fifteen-day clause in his contract. This change under the circumstances and on account of Geyler's long connection with Hudson created quite a stir throughout the trade, many dealers viewing their contracts with less confidence than they have given them before. The language of the disputed contract occurs in similar agreements among the trade, consequently the result of Geyler's legal action will be watched with interest.

The \$800,000 damages are for commissions on cars sold for delivery up to Nov. 30 when his contract was cancelled June 1. The two motor car concerns have refused to pay, Mr. Geyler says, pointing to a provision of the contract which empowers them if it is cancelled before its terms has elapsed to take outstanding business without re-

muneration.

HARRISON IS PARRETT SALES DIRECTOR

Chicago, August 26-J. Robin Harrison, sales promotion manager of the Parrett Tractor Co., has been appointed director of sales of that concern and will have complete charge of the sales service and sales promotion department of the company.

COLUMBIA TO ADD MODELS

Detroit, Aug. 22-The Columbia Motors Co. is about to add two new models to its regular line. The new cars are a two-passenger open roadster and a four-passenger coupe. Production on the roadster will start Sept. 1, while the new coupe will be coming through by Sept. 15. The Columbia closed cars for the coming season will be distinguished by the straight-line effect and simple treatment of finish.

The company is building a new factory which will permit double production and expects to be established there soon. The 1920 production schedule calls for the manufacture of 12,000

cars.

France to Buy All A. E. F. Motors Left

This Includes About 60,000 Cars and Trucks—20,000 Motorcycles in Lot

PARIS, July 31—France has agreed to purchase the whole of the left-over supplies of the American Expeditionary Forces, including about 60,000 cars and trucks and 20,000 motorcycles and sidecars.

Negotiations have been in hand for a considerable time. The American government offered the whole of its material to the French and refused to consider treating for only parts of this material. It was desired by the French to purchase only such material as was specially required in France, railroad rolling stock, food supplies, tractors, buildings, etc. The cars owned by the A. E. F. were not desired. It was made clear, however, the American government would not consent to separate the material. It was owing to this that a settlement has not been possible earlier.

The general estimate of the value of the American material secured by France is \$1,000,000,000. This, however, is only a guess. No official figures have been issued, and no information on the value of the material has been given out. The agreement has yet to be ratified by the French parliament, and when this is done it is understood announcement will be made regarding the actual price paid for these A. E. F. supplies. It has been reported generally in all papers here that the cars numbered 100 to 110,000. This is incorrect. Even including bicycles and trailers, the number only reaches 100,000. A very accurate estimate of the number of American motors is 60,-000, of which 45,000 are trucks and the rest touring cars.

All these vehicles are being collected in five parks: Clichy, near Paris; Romorantin, Verneuil, Le Mans and Bourg. It has not yet been decided how they will be disposed of. In all probability they will be mixed with French material now being sold by auction in various parts of the country. These sales, which up to the present have only included cars and trucks from the French army, have realized more than \$20,000,000. It is not at all certain, however, they will all be offered for sale in France. There is a demand in many other European countries, such as Rumania, Poland, Belgium, Tcheco-Slavia, etc., and the French doubtless will take advantage of this to dispose of some of its stocks.

U. S. GETS PARIS SHOW SPACE

Paris, July 28—Fifteen American manufacturers have secured space in the Paris show to open in the Grand Palais Oct. 9. They are Buick, Cadillac, Ajax, Harley-Davidson, Hup, Indian, Maxwell, Mitchell, G. M. C., Dodge, Willys-Overland, Chevrolet, Oakland, Olds and Scripps-Booth.

In addition to these firms ten accessories and tire makers have secured space. They are Boyce Motometer, Gaston & Williams, Goodrich, Goodyear, Hoyt Metal Co., Oilday, Bowser, Klaxon, Vacuum Oil Co.

N. I. V. A. CONVENTION

Chicago, Aug. 25—The twenty-sixth annual convention of the National Implement & Vehicle Association will be held here at the Congress hotel Oct. 15-17.

M'CLAREN HEADS J. & D.

Charlotte, N. C., Aug. 25—H. L. Mc-Claren, who recently resigned as president and general manager of the Ajax and Racine rubber companies, has been made president and active general manager of the J. & D. Tire Co. Mr. Mc-Claren has purchased a substantial interest in the factory.

SCHMIDT LEAVES CROW-ELKHART

Elkhart, Ind., Aug. 25—H. B. Schmidt has resigned as one of the directors, vice-president and purchasing agent for the Crow-Elkhart Motor Corp. to become manager of the car department of the Huffman Brothers Motor Co.

G-O MAKES CORRECTION

Cedar Rapids, Iowa, Aug. 22—The General Ordnance Co. advises that the report on the unofficial demonstration of its tractor at Wichita, which gave the tractor as pulling two plows at a speed a fraction over 2 m.p.h., is correct as to speed but the G-O tractor pulled three plows every afternoon during the demonstration.

MOORE LEAVES MOORE CAR

Danville, Ill., Aug. 25—The Moore Motor Car Co. has been reorganized here and George L. Moore, president, and A. C. Leonard, vice-president, have resigned to enter other lines of business. Mr. Moore retains his stock in the concern, however. The new officers are E. K. Gallagher, president; J. H. Vickers, vice-president, and John F. Bickle, secretary-treasurer.

OLYMPIAN GETS NEW CAPITAL

Pontiac, Mich., Aug. 22—The Olympian Motors Co. has voted a \$300,000 bond issue. The new money puts an end to the financial worries of the company and will permit it to get into production on a big scale. The company contemplates producing 1000 cars between June and January, while 5000 cars is the schedule for 1920.

A \$25,000 mortgage held by the General Motors Corp. has been paid. The Olympian company occupies the old

Cartercar plant formerly owned by General Motors. This plant is capable of handling present production but to cope with the increased 1920 production schedule additions may be necessary. The Olympian company has closed for inventory this week.

Fred K. Parke has resigned as president of the company. It is said that a new president will be named within a few days. Vice-President St. Clair Couzens has been made general manager of the company. L. A. Shadburne of Chicago has been added to the board of directors.

HARE RESIGNS FROM PACKARD

Detroit, Aug. 22—Emlen S. Hare, vice-president of the Packard Motor Car Co., Detroit, has resigned. His career with the Packard company started as truck salesman in New York, then sales manager and president. He resigned as president to become vice-president of the parent organization in Detroit. He has announced no future plans. His successor will be named at the directors' meeting of the company early in September.

FULTON NEW ENGLAND BRANCH

Boston, Mass., Aug. 23-As a result of the convention of the Fulton truck officials and dealers at New York this week it was decided to make the distribution in New England a factory branch. A. H. McIntyre, who was New England district manager, and Percy Ford, sales manager for C. B. Ransom, Inc., will direct the affairs of the branch. They have taken over the sales and service quarters of Mr. Ransom and will continue the business there. Mr. Ransom has handled the Fulton line for about a year, it having been handled previously by A. N. Sowers of the Jackson Motor Car Co.

WHITE OFFICIALS AT CLAMBAKE

Marshfield, Mass., Aug. 23—Vice-President Walter C. White and Sales Manager George F. Russell of the White Co. made a special trip from the factory at Cleveland to be present to-day at the annual clambake for the members of the Boston branch at the summer home of Josiah S. Hathaway on the south shore. It was a real feast of clams and corn, with a few hours devoted to golf and swimming. About fifty were present.

COMMISSION REGULATES LEASING OF GAS PUMPS

Washington, Aug. 23—The Federal Trade Commission has taken action to stop the leasing of gasoline pumps and tanks to retail dealers by oil companies on exclusive leasing terms intended to stifle competition. The order to cease this practice has been served on the Standard Oil Co. of Indiana and prohibits the company from entering into contracts or centinuing after four months to operate under existing contracts which provide that dealers, as a consideration for the lease of pumps

and tanks, shall use them only for the handling of gasoline and products sold by the company.

Under the action of the commission Standard Oil is to report to it fully within thirty days after the four months the nature of the new contracts or arrangements it makes with dealers.

The leasing of tanks and pumps at rentals below those warrantable to insure reasonable profit, on the condition that they would not be used to distribute the products of competitor companies, the commission found, is an unfair method of competition in violation of law.

STROMBERG EARNINGS

Chicago, Aug. 22—The general profit and loss statement of the Stromberg Carburetor Co. of America for three months ended June 30, 1919, shows earnings of \$201,010 and other income of \$2,282, making the total income \$203,293. After deductions of \$54,539 expenses, \$25,000 reserve for Federal taxes and dividends of \$50,000 were made, a surplus of \$73,754 remained, which is \$62,052 more than the \$11,702 surplus for the preceding quarter. Profit and loss surplus on June 30 amounted to \$1,243,056.

OUTING OF GOODRICH EMPLOYEES

Boston, Mass., Aug. 23-One of the big events of the week was the annual outing of the New England men and women affiliated with the B. F. Goodrich Rubber Co., which took place Tuesday at Nantasket beach. The party, numbering about 500, met at the Boston branch and marched to the wharf, where a special boat took them to the The forenoon was spent in swimming races and the afternoon in sports for men and women. There was a big dinner at Paragon park followed by dancing in the evening. Fred T. Moore, manager of the New England branch, lives at the beach and he comprised a welcoming committee.

WATERLOO PLANS FALL SHOW

Waterloo, Iowa, Aug. 23—Waterloo motor car and truck dealers are making preparations for their annual fall show. The show this year will be held in connection with the Waterloo Dairy Cattle Congress and the Belgian horse show, both of which attract visitors from all over the country. The motor car exhibit will be in charge of the Black Hawk County Motor Trades Bureau of which C. A. Clark is president and Verne Orr, secretary.

FORD PARTS PLANT PLANNED

Mount Clemens, Mich., Aug. 22—A \$500,000 factory will be built here by Henry Ford for the manufacture of motor car and tractor parts. It will get its power from the Clinton river. The Ford engineers are now at work locating a suitable site. A concrete dam, 125 ft. long, will be built. When complete the new plant will employ between 300 and 400 men.

French Makers Against Grand Prix

Race Is Uncertain—Twelve U. S. Cars Reported to Be Starters in 1920

ARIS, July 31-Some of the leading French manufacturers are doing their best to kill the 1920 Grand Prix race. A meeting has just been held of the Chabre Syndicale des Constructeurs, which corresponds to the Automobile Board of Trade, when a unanimous vote was taken against racing in 1920. It was not at all a difficult matter to engineer such a vote. Under the most favorable circumstances there must be a greater number of makers who will not race than of manufacturers who are decided to build speed creations. All that was necessary, therefore, was to get together a meeting from which the racing enthusiasts would be excluded to obtain an apparently unanimous vote of the French trade against racing.

The leader of the racing opposition is Louis Renault, the most important motor manufacturer in France, who has not taken part in any speed contest since he won the Grand Prix of 1906. The idea of the big manufacturer is that racing only tends to bring the small makers to the front to the detriment of the old established firms. Immediately after the armistice it was attempted to kill all the racing effort in France when the manufacturers' association decided that none of its members should take part in any sort of competition or speed contest.

Ballot Proved Case

Ballot defied the official body and proved the absurdity of their contention that there was not time to build racing cars by producing his machines in about 100 days.

The sporting commission of the Automobile Club of France, which has sole charge of racing in France, has not yet decided what it will do. It is making an inquiry among manufacturers with the view to ascertaining their ideas. If sufficient support is given, the race will be held, and there is no doubt the rules will be 3-liter cylinder capacity and a race will be run somewhere in Alsace. As it only requires the support of five or six French manufacturers, with a few foreign firms, to assure the success of the race, there is still quite a possibility that it will be held despite the boycotting efforts of the manufacturers' association.

News received here to the effect that American makers will take part in a French Grand Prix under 3-liter rules has attracted considerable interest in sporting circles and aroused mixed feeling among opponents of racing. Indianapolis appears to have adopted 3 liters under the false impression this already was decided on for the French Grand Prix. This assumption is incorrect, for it is not even certain that a French Grand Prix will be held next

year. But America having adopted what are admittedly European conditions, it is hardly possible for European cars to refrain from participation. American victory in a French race would be a rather bitter pill to swallow. but if that victory was obtained under French rules and conditions with which France has had years of experience and America practically none, the result would be almost disastrous. On this account there is a growing feeling that France ought to prepare a really strong field to meet the twelve American cars and drivers reported to be almost certain starters in the 1920 Grand Prix, that is to say, if there is a 1920 Grand Prix.

The sporting commission states it will hold its race if reasonable support is promised; probably in two or three weeks the fight will have been decided.

ENTRIES FOR UNIONTOWN

UNIONTOWN, PA., Aug. 22—With twenty-one cars already entered, interest in the racing world is focused on the Labor Day meet at the Uniontown speedway, when a 225-mile race will be staged for a purse aggregating \$25,000. First prize is \$5,000. In order, the next four four prize are \$3,000, \$2,000, \$1,500 and 1,000. It will be the greatest race ever staged on the Uniontown track and, with the exception of the Indianapolis race, the longest event offered followers of the sport since the war. To date the following entries have been filed:

CHUICO MUIO DCCM MICA.	
Driver	Car
Omar Toft	Toft
Ralph Mulford	.Frontenac
Louis Chevrolet	Frontenac
Joe Boyer	
Gaston Chevrolet	.Frontenac
James Murphy	Duesenberg
Thomas Milton	Duesenberg
Tom Alley	Bender
Toland Nicholson	
Dave Lewis	Meteor
Denny Hickey	
Barney Oldfield	
P. W. Monahan	Peerless
H. L. Robinson	Haynes
Nick Swick	Not named
William Vetere	Duesenberg
Bennett Hill	Aetna
Harry Cooper	Aetna
Kurt Hitke	
Joe Thomas	
Art Kline	
Ira Vail	

WISCONSIN PARTS ELECTS OFFICERS

Oshkosh, Wis., Aug. 23—Officers elected for the Wisconsin Parts Co., formerly the E. B. Hayes Machinery Co., are: President, W. F. Rockwell, until recently vice-president in charge of engineering and construction of the Torbensen Axle Co.; vice-president, J. F. Hayes, formerly president of the Hayes company; treasurer, Louis Schriber; secretary, E. J. Dempsey; assistant secretary, E. H. Rhyner; assistant treasurer, A. H. Chatley.

Official Results of Ohio Tractor Demonstration Tests

	Depth Plow'd		9.40 8.622 8.252 8.31 8.112 8.60 8.60	8.94 7.25 8.69 8.69 8.69 8.55 8.77 7.55 8.55 8.55 8.55 8.55 8.55	8.642 8.677 7.956 7.956 7.957 8.87 8.87 8.057 9.42 9.42 9.42 9.42 9.42 9.43 9.43 9.43 9.43 9.43 9.43 9.43 9.43	88.78 88.78 88.78 88.78 88.76 99.08 99.08 88.77 88.87 88.77 88.87 88.77 88.87 88.77 88 88.77 88 88 87 87 87 87 87 87 87 87 87 87 8
MUM TEST	E	1	13.38 11.50 11.29 15.45 16.67 10.62 11.65 8.16 8.16	13.40 12.82 15.82 15.92 16.93 16.93 16.93 17.77 17.73	10 66 14.92 15.25 7.97 7.97 10.66 26.50 14.72 16.72 16.72 17.10 19.82 14.43 14.43	13.04 12.45 9.70 14.73 9.33 9.33 17.0 13.09 11.70 9.04 9.04 11.70 9.04 9.04 11.29 9.04 11.39 9.04 11.39 9.04 9.04 9.04 9.04 9.04 9.04 9.04 9.0
	Trav.	MPH	2.65 1.35 1.37 2.13 2.31 2.31 2.07 2.07 2.89	22222222222222222222222222222222222222	2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.	98298999999999999999999999999999999999
MAXIMUM	Rate of Trav.	FPMMP	233.3 110.0 156.2 187.5 173.8 190.7 192.0 175.0 254.2	205.0 204.0 172.0 147.8 216.0 175.0 175.0 176.0 170.0 181.8 322.0 164.0 182.5 203.2 203.2 203.2	231.5 192.2 185.7 172.5 271.5 271.5 271.5 147.5 180.5 180.5 280.7 280.7 176.0 168.0	237.0 226.0 180.0 196.0 238.2 196.5 196.0 253.0 155.0 156.0 156.0 157.0 187.5 187.5
	Lb.	1	1892 3450 2710 2720 2720 2705 1687 1838 2000 1475 3125	2158 2074 1000 2280 2300 1800 1800 1600 2800 2800 2800 2800 11240 11312 1312 2800 2800 2800 2800 2800 2800 2800 28		1815 1818 1818 1818 2480 1290 1708 1708 1950 1950 1370 1688
	Depth	Flow d	7.69 7.65 7.65 8.06 8.20 7.68 7.30 7.30 7.31	7.85 6.75 6.75 6.75 6.75 6.83 6.83 6.83 6.83 6.83 6.83 6.83 6.83	8.50 7.35 7.35 7.35 7.35 7.35 7.35 7.35 7.35	8 7.81 8 7.82 8 7.82 8 8.32 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
EST		H.	10.69 12.95 10.38 12.98 18.72 10.88 11.58 14.87	12.85 14.05 15.13 15.13 15.13 15.13 16.13 16.13 17.03	9.90 14.58 14.39 6.12 6.12 10.76 14.73 15.69 9.60 18.35 15.78 15.78	13.11 11.47 13.72 8.50 8.50 11.48 11.60 9.52 6.86 6.86 8.60
NORMAL TEST	Trav.	MPH	2.25 2.35 2.35 3.35 3.35 3.35 3.35 3.35	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2.52 1.52 1.52 1.93 2.13 2.153 2.153 2.153 2.33 2.33 2.33 2.33 2.33 2.33	25.25.25.25.25.25.25.25.25.25.25.25.25.2
NOR	Rate of Trav	FPMMP	243.6 210.0 153.0 272.0 272.0 272.5 205.5 198.5 214.0 191.5	250 0 260 0	230.0 182.5 184.5 184.5 180.0 288.0 167.5 171.5 171.5 268.0 210.0 165.1	240.0 193.0 196.0 240.0 187.5 187.5 270.0 270.0 270.0 270.0 270.0 178.7 178.7 178.7
	Lb.	Full	1448 2038 2235 1947 1304 1748 1926 1418 2540	2020 893 893 1905 11690 11690 11520 11520 11520 11520 11520 11640	1420 2470 2600 1500 1972 2760 2778 2800 1642 1845 2860 2480 2480	1802 1962 1666 2730 1170 2020 2020 1643 1848 1403 1266 2070
	Footing		00000000000000000000000000000000000000	Fair Fair Poor Poor Poor Fair Poor Poor Poor Poor Poor Poor		Good Poor Poor Fair Fair Poor Poor Fair Fair Fair Fair
	Previous Crop		Wheat Wheat Wheat Wheat Wheat Wheat Wheat Wheat	Wheat Clover Wheat	Timot'y Timot'y Timot'y Wheat Wheat Timot'y Wheat Timot'y Wheat Wheat Wheat	Timot'y Wheat Wheat Wheat Wheat Wheat Wheat Wheat Timot'y Wheat
	Plows		25-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8-8	**************************************	4444444444444444	88844888888888888888888888888888888888
	Plow-	Speed	89 1 9 8 8 9 9 9 9 9 8 8 7 7 7 7 7 7 7 7 7 7	28 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	99959999999999999999999999999999999999	220022222022 80 0402 022 80 0402
	Weight		3150 6900 7500 5600 3380 2700 4200 4000 5200 4750	5000 5200 5200 53800 53800 53800 7400 7400 7400 6000 6000 6000 8350 8350 8350 8350 8350 8350 8350 8	3000 3500 3500 6000 6000 6000 7400 7800 3300 5525 5526 5900	5200 4750 5200 5200 4000 4200 2700 750 4000 6900 6900 8150
		W heels	Land Land Land Land Land Land Furrow Furrow Furrow Furrow Furrow Furrow	Furrow Furrow Furrow Furrow Land Land Land Land Furrow	Furrow Furrow Land Furrow Furrow Land Furrow Land Furrow Furrow Furrow Furrow	Furrow Furrow Furrow Furrow Furrow Furrow Furrow Land Land Land Land Land Land Land Land
	Type		Crawler Crawler 4-Wheel 4-Wheel 2-Wheel 4-Wheel 3-Wheel 4-Wheel 4-Wheel 4-Wheel 4-Wheel 4-Wheel	4 Wheel 6 Tawheel 4 Wheel 6 Tawheel 6 Tawheel 6 Wheel	4-Wheel Crawler Crawler 4-Wheel 4-Wheel 4-Wheel Crawler Crawler Crawler 4-Wheel 4-Whee	4-Wheel 4-Wheel 4-Wheel 4-Wheel 3-Wheel 4-Whee
		RPM	1250 1000 570 950 1600 1000 750 750 1050 800	1000 1000 1000 1000 1000 1000 800 800 80	250 900 1100 750 750 800 800 850 850 850 850 850 850 850 8	1000 1000 800 1050 750 750 1000 1000 1000 1250
	ENGINE	Size	33,4x5/ 61/2x7 61/2x7 61/2x7 4 4 2x6 6 x7 6 x7 6 x7 8 x5 7 8x5 7 8x5 8 x7 8 x6/x	44.42.72.74.44.42.72.72.74.44.44.72.72.72.74.44.44.42.72.72.72.72.74.44.44.72.72.72.72.72.72.72.72.72.72.72.72.72.	55.25.25.25.25.25.25.25.25.25.25.25.25.2	444 x 54
		Cyl.	44044400444	4 4 2 2 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4	23 4 4 4 4 21 4 4 4 4 4 21 4 21 21	***************
	Rat-	ng	12-20 16-30 15-27 15-27 10-20 12-24 10-18 18-36 10-20	274-0-174-0 888-888-888-88-88-88-88-88-88-88-88-88-	8424 - 21 - 21 - 21 - 21 - 21 - 21 - 21 -	12-25 10-20 10-20 10-18 10-24 12-24 12-24 12-25 12-25 12-25 12-20
	TRACTOR		1 Cletrac 2 J. T 3 Avery 4 Case. 5 Moline-Universal 6 Fordson. 7 La Crosse 8 La Crosse 9 Case. 9 Case. 9 Illington Wellington	12 Huber 13 Parrett 14 Reliable 15 Waterloo Boy 16 Wallis 17 Titan 17 Titan 18 International 19 Ault-Taylor 20 Monarch 21 E-B. 22 Shelby 23 Hart-Parr 24 Heider 25 Heider 25 Bates Steel Mule 26 Bates Steel 27 Frick 28 Whitney		43 Parrett 44 Huber 55 Wellington 66 Illinois 67 Case 69 Fordson 60 Fordson 61 Moline Universal 62 Case 63 Avery 65 J. T. 66 Cletrne
			COLUMBUS TESTS dry, heavy subsoil	soil, raining during tests of Nos. 14 & 16	hidden rocks	AKRON TESTS Sandy Loam, dry and hard, hidden rocks

Few Reach Rating in Ohio Tests

Majority of Tractors Fell Short of Advertised Horsepower—A Good Many Came Pretty Close

O NE of the first things gleaned from ing by a big margin was the Molinestudying the results of the dynamometer tests of tractors conducted this month by the Department of Agricultural Engineering of Ohio State University is that the majority of the machines tested fall short of their rated horsepower. It is true that where soil conditions were excellent many of the machines went up to or even over their rating, but taking the average of the two tests which each tractor received we find that something like twenty of the twenty-eight machines are under their catalog figure. But in a good many cases the average figure computed from the normal tests under both good and bad conditions comes pretty close to the advertised rating.

Thus, in a large measure it might safely be stated that altogether the tests show that things are shaping themselves a little better in the tractor industry and manufacturers are more conservative in their ratings. The officials who had charge of these tests followed a carefully-laid plain, so that nearly every tractor got a test under excellent or, at least, favorable conditions, and also a test under poor conditions. Very often the machine that fell below its rated horsepower under poor soil conditions or footing more than made up for the loss when it came to a test under average or good working conditions. For example, the E-B 12-20 under excellent conditions showed 13.20 on the dynamometer and 11.86 with a poor footing, but the average brings the figure to 12.53 hp.

These Went Over Rating

The tractors that came up to their rated horsepower or went over the rating include the Parrett, Wellington, Waterloo Boy, Wallis, International. Emerson-Brantingham, Moline and Hart-Parr. The last performed particularly well in the tests at Fostoria, where it encountered ideal conditions. The dynamometer registered 3220 lb. pull on the Hart-Parr here, and the machine was traveling at the rate of 271 ft. per minute. This gives 26.50 hp. on the drawbar, while the machine is given a rating ordinarily of 15" hp. Also it is interesting to note that during this test the Hart-Parr was pulling three 14-in. bottoms to a depth of 10.25 in.

Taking the same machine under poor conditions, as at Middletown, we find it came very near to its rating, the figure being 14.77, with the plows going down 8.08 in. The figures just mentioned and those in the preceding paragraph are taken from the maximum test. The figures on this job in the normal tests are but slightly below.

Another tractor that went over its rat-

Universal, not only where the conditions were good but where they were decidedly poor. Ordinarily the Moline is rated at 9 hp., but the average horsepower of the two tests gives 16.08 hp.

If consistency is of any value in a tractor test, then the Parrett deserves favorable mention. Of course, the machine, operated under good or fair conditions, but even so, never did it fall below its rated drawbar horsepower of 12 hp. Its average horsepower rating for the two tests, under normal conditions, was 12.68. Its lowest figure was 12.25, and the highest 13.11. The Parrett also has a plowing speed ordinarily given as 2% m.p.h. In the tests the plowing speeds were as follows: 2.27, 2.32, 2.73 and 2.69 m.p.h.

The heaviest machine tested out was the 15-30 Aultman-Taylor, which weighed 7800 lbs., while the lightest job represented was the Fordson with 2700 lbs. The Fordson in its tests came very close to its rated drawbar horsepower of 10 hp., the exact average being 9.84 hp. It

MONARCH NOW GENERAL TRACTOR

Watertown, Wis., Aug. 16-The Monarch Tractor Co., with factories at Paulsboro, N. J., and Brantford, Ontario, has increased its capitalization under the name of General Tractors, Inc., and has opened offices in Chicago and New York.

D. V. Halcomb, formerly field sales manager of the John Lauson Mfg. Co., has been made general sales manager of General Tractors, Inc.

TO HANDLE DEALER PAPER

Boston, Mass., Aug. 22-Chester I. Campbell, manager of the Boston shows, is actively identified in forming a financial corporation which will handle paper for motor dealers throughout New England. He will be president.

Several other such corporations have been formed in Boston recently to handle motor paper, and the latest one to get going is the National Acceptance Corp., a \$5,000,000 concern with Edward C. Boyce, who was president of Metz while the Government had charge of it, as president. On the board of directors is Eugene W. Lewis, formerly with the Timken axle company.

The Commercial Finance Corp., formed some months ago, has F. A. Minchcliffe, treasurer of the Boston Automobile Dealers Association and agent for the Jordan line, also John L. Judd, who has the Allen car and several trucks, as members of the board of directors.

also exceeded its rated plowing speed of .. 3 m.p.h., plowing at the rate of 3.09 m.p.h at the Columbus test, to a depth of 7.68 in. This was during the normal test. In the maximum test the plowing rate slowed down to 1.97, but the plows were going down 8.25 in.

While some of the machines seemed to have fallen short considerably of their rated horsepower, the figures cannot be taken as thoroughly representative of the tractors' performances. Thus, for instance, the Reliable, which is ordinarily rated at 10 hp., showed but 6.22 in the averaging up of the two tests. Rain was falling when the Reliable was tested at Middletown and the footing was poor. At that, during this test the machine plowed within 0.09 of its plowing speed of 2 m.p.h, but the plowing was not very deep, as shown by the chart.

Three crawler types of tractors were tested, the Cletrac, Monarch and J. T. While these machines fell below their rated horsepower in the averaging up of the normal tests, one of them, the Cletrac, went over its rating of 12 hp. in the maximum tests, with 13.38 and 13.19 hp. The Monarch, which is rated at 18 hp. averaged 14.92 hp., while its highest horsepower attainment was 15.91 hp. The other crawler-type tractor, the J. T., fell 3.60 hp, short of its rated 16 hp. in the average figure of the two normal

LaCrosse Performance

It is quite interesting to note the performances of the two LaCrosse tractors, in view of the fact that both have the same size of engine, etc., but differ only in the number of wheels, one being a three-wheeler while the other is a four. The average drawbar horsepower of the three- and four-wheel machines, as obtained during the normal tests, is 11.02 and 11.53 hp., respectively. So far as plowing speeds are concerned, the fourwheel job had the better of the argument at Columbus, while conditions were just the opposite at the Akron tests.

There is considerable chance to sift the evidence found by the Ohio tests. While it is true the machines were not all tested under exactly the same conditions or the same day, there was, nevertheless, a good averaging up, for where one job got a poor layout on the first trial, it had a chance to come back on . the second trial and vice versa. It is only to be regretted that there was no measurement of the fuel and the oil consumed. Had this been done, it would have been possible to do a great deal of cross checking but, as it is, the results of the Ohio tests are to date the best collection of evidence we have regarding tractor performances.

Aberdeen Event Also Disappointing

Crowd was Smaller Than That at Some of Local Ohio Tractor Demonstrations

A BERDEEN, S. D., Aug. 22—Additional and conclusive proof was presented here this week that a national tractor demonstration no longer presents attractions for the farmer. The Northwest Tractor Demonstration, closing here today, drew a smaller aggregate crowd than that which attended some of the local Ohio demonstrations, for instance, held during the last few weeks. On the first day here there were only a few hundred real farmers present. A liberal estimate on the crowd yesterday would be 5000. No more are present today.

Crowd a Disappointment

This is a keen disappointment to Aberdeen, which had prepared for and expected a crowd of at least 25,000. It merely goes to show without the peradventure of a doubt that national tractor demonstrations are dead as far as drawing a crowd is concerned and that the thousands of dollars spent in putting them on would better be spent in some other way. Following the Wichita show this was the expressed sentiment of a majority of the tractor manufacturers represented there. The Aberdeen demonstration has stiffened that sentiment into a profound conviction. National tractor demonstrations, as they have been conducted in the past and as they have been conducted during the present year, are as dead as Caesar. They must give way to something else.

That which will supplant them will be the state or local demonstration, for that there will be future demonstrations of some sort is certain. Most of the manufacturers believe there is and that there will continue to be a demand for demonstrations but that future demand will be strictly local in its nature. Even By Fred M. Loomis Motor Age Editorial Staff

those manufacturers who have been most insistent upon the perpetuation of the national events have come to this way of thinking and express themselves as reconciled at last to the inevitable.

Perhaps J. B. Bartholomew, president of the Avery Co., comes as nearly expressing the opinion of those manufacturers favoring demonstrations as anyone can when he says:

"There will be future tractor demonstrations because there is a demand for them. I always have been in favor of demonstrations. I do not suppose it would make any particular difference to the Avery Co. whether there were future demonstrations or not, but I always have tried to be bigger than my own individual interests and I have been willing to do what I could to further the industry as a whole. As long as there is a demand for such shows I am in favor of holding them. I would, myself, be in favor of putting on a tractor demonstration in every state of the Union so that every section might see what the tractor can do. These could take the place of the big shows such as we have been giving."

The general opinion of the tractor men, freely expressed nowadays, is something like that, only with individual modifications. Most of them will favor tractor demonstrations of a local character, put on by distributers and dealers with the assistance of the factories. Also a larger proportion of them than used to be the case are willing to confess that a mere plowing demonstration, such as those held at Wichita and here, gets nowhere, and they are verging toward the idea that demonstrations must be conducted

in such a manner, and under such a code of rules, that they actually will determine something about the relative capacity of the various machines to meet local conditions. They see, because they are not blind, that a mere plowing and fitting demonstration means nothing to the farmer and does not further the interests of the manufacturer. Some of the manufacturers have been in the business long enough now to have gained confidence in their own machines and they express a willingness to submit them to fair tests to determine their quality. Upon the other hand, there still are some who are recalcitrant in this respect.

Tests Will Come

However, such legislation as has been enacted in North Dakota and in Nebraska during the last year is having the effect of convincing them that unless they want to see similar legislation in many others of the states, they must modify their objections to a fair test and must submit themselves to a series of demonstrations which really will mean something. The curiosity which exists at present over the probable results attained during the recent Ohio demonstrations is evidence of the interest the manufacturers are taking in such things.

And while speaking of the past, present and future of tractor demonstrations, something pertinently may be said about the annual national tractor show. There is an unanimous sentiment that there should be one such event which shall be comprehensively illustrative of the advance of the tractor industry. Furthermore, judging from the individual expressions of opinion which it was possible to get at Wichita and at Aberdeen, this show should be located in Chicago and it should be under the direction and control of the National Implement and Vehicle Association. The tractor men believe their industry now has grown to be too big to trust its annual show to private interests. They profess the opinion that as it must be national in its scope it should be under the direction of a national organization.

Weather conditions at Aberdeen have been ideal and the quantity of dust and dirt has been normal. The soil was dry and in some places hard, but it was friable and after turning pulverized easily under the fitting implements. Generally speaking the work done by the tractors was entirely satisfactory and only an expert on plowing could pick serious differences in quality. There was singularly little difficulty either with tractors or plows.

The plats plowed were considerably larger than those alloted at Wichita, consequently the machines were in the fields longer, and it was possible for any one who wanted to see any particular tractor



Looking down the row of exhibitors' tents at Aberdeen, some well-known names are in sight

at work to get to it before it had finished its stunt and was on its way back to the tents. In character the demonstration was precisely similar to that held at Wichita, hence whatever may have been said of that event in commendation or condemnation will apply with equal justice to the Aberdeen show.

The first day eighty-one machines, of thirty-two makes, participated. Of these fifty-eight pulled moldboard plows of some kind, while one pulled a disk plow. The other twenty-two tractors in the field were hitched to fitting implements, seeders, binders, straw spreaders, water tanks and the like. The condition of the soil was such that the demonstration given by the fitting implements was very satisfactory.

More Four-Bottom Tractors

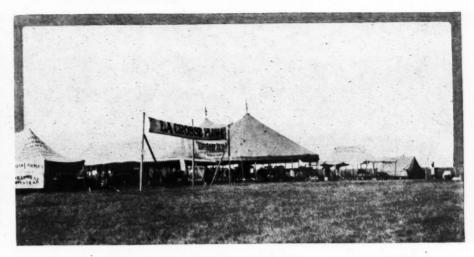
Naturally, the region in which the demonstration was held determined to a considerable extent the type of the tractors demonstrated, as it did also the kind and size of the plows pulled. For instance, there was a larger proportion than usual of tractors with a capacity of more than four bottoms. Also more engine p'ows were pulled than were ever before exhibited at a similar event. In addition there were a considerable number of tandem outfits, consisting of two and three-bottom plows so hitched. Some concerns making a line of tractors had one of every size in the field, each pulling its appropriate number of bottoms. This lent greater variety to the show, but it added nothing to its effectiveness nor to its value.

The one disk plow, put into the demonstration by Emerson-Brantingham, was something of a novelty to many of the farmers present, because the disk plow has never been used to any great extent in this part of the country. The purpose behind this particular demonstration was to show how efficiently the disk plow would pulverize South Dakota soil and thus put the latter in a condition the better to conserve moisture.

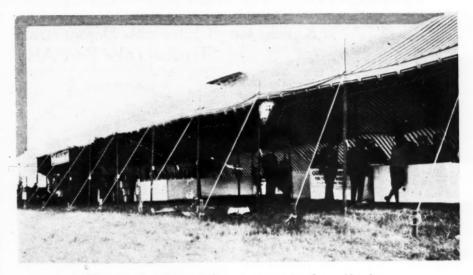
During the three days of the demonstration about 1700 acres were plowed. This was the fact which perhaps made the deepest impression upon the minds of the visitors. Comment was frequent that the efficiency of the tractor to take care of the peak load on the farm was more clearly demonstrated by the amount of work done within the time limits of the demonstration than by any other one fact.

The display at the tents was characteristic, but it was not as large as it was at Wichita this summer or at Salina last year. There were, however, some displays that were distinctive insofar as they exhibited implements especially adapted to conditions in this section. In addition there were several live exhibits of belt power applications in the way of grain separators, silo fillers and feed grinders. All such machines were running idle, however.

The accessory show was very limited. Outside of a few of the concerns which always are seen at such events the accessory tents housed principally a display of the local automotive interests.



A view across the base of the triangle at the tractor demonstration



Here is one section of the accessory triangle at Aberdeen

The exhibits ran overwhelmingly to motor cars, trucks and farm lighting plants. The number of the two last was indicative of the degree of interest the Dakotas are manifesting in these things.

The crowd was almost exclusively local. Here and there, to be sure, one might run onto a dealer or a farmer who had come from a considerable distance, but such cases were exceptional. The same excuse was offered here, as at Wichita, to explain why the crowds were so meager, namely, that the farmers were too busy with their throshing and other fall work to take time off for a tractor show. However, so slight is the drawing power of a tractor demonstration these days that it is doubtful if a larger attendance could have been attained at any other season of the year or if visitors from a greater distance could have been attracted.

Aberdeen business men are entitled to all kinds of credit for the way in which the show was handled. Committees were appointed early, and every detail was worked out in advance. Everybody was taken care of expeditiously and comfortably, and in no single instance was there even an attempt made at extortion. On the contrary, visitors were favored at the expense of the home people and actu-

ally paid less for their accommodations. This was in delightful contrast to what has happened at some other places.

Aberdeen was lavishly but tastefully decorated for the occasion, and all manner of entertainment was provided for the crowds. There were special ball games for the fans, street parades, a street fair and carnival and even midnight shows at the local playhouses. In fact, nothing was left undone to make the crowds have a good time. Indeed, so much was done in the way of outside attractions that some were of the opinion that the main show, the tractors, suffered by comparison.

Tractors at Aberdeen

The demonstrations included the following tractors: Titan, International, Turner, Liberty, Heider, Bates, Waterloo Boy, Russell, E-B, Moline, Cletrac, Townsend, Wallis, LaCrosse, Hart-Parr, Monarch, Eagle, Huber, Fordson, Plowman, Holt, Case, Parrett, Aultman-Taylor, Gray, Oil Pull, Flour-City, Twin-City, Avery, Stinson, Illinois, Dakota, Farm Horse, Allwork and Tu-Ro.

Several concerns which were entered and which expected to be present were prevented from participating by the nonarrival of their machines. Among these were the Lauson and the Frick.



A general view of the scene at the tractor demonstration held during the Missouri state fair

Staging Tractor Trials at State Fair

Kansas City Club Finds Demonstration Success— Trucks Take Part Also

S EDALIA, MO., Aug. 22—"The Missouri state fair tractor show and plowing demonstration was worth a million dollars to the farmers of this state, for many hundreds of would-be buyers did their deciding as to the type to buy—and they will buy and are buying."

This statment by Jewell Mayes, secretary of the state board of agriculture of Missouri, in a nutshell describes the pronounced success of the tractor demonstration at Sedalia.

The efficient management of the demonstration by the Kansas City Tractor Club through Guy Hall, its secretary, was one reason for its success. A thorough publicity campaign covered every corner of the state, to every farmer and every dealer. Every little detail, even to ice water on the field, was carefully attended to. The grounds for demonstration were within a mile, easy walking distance, of the fairgrounds; visitors got pass-out checks to go to the tractor field.

Held Two Days

The demonstrations were at 10 o'clock Thursday and Friday mornings, not interfering with any item of general interest on the fair program. There was a gravel road for part of the distance for the tractors to travel over to the fields, W. F. Saunders, farm power engineer of the Kansas state agricultural college, attended to technical details, such as marking the field and directing the operators. There was no hitch anywhere, in starting, operating, complying with rules or finishing.

The fields were fairly typical for the central part of Missouri, rolling ground, about 100 acres for each day, wheat stubble. The field plowed Thursday was troublesome ground, inclined to clay, baked on the surface, and for some reason extremely hard underneath. The field plowed Friday was of lighter texture, more and higher weeds, and offered a quite different problem of plowing.



The lieutenant governor of Missouri with flag and Secretary Mayes standing in a car

The fair came after a period of dry weather. Plowing has been seriously delayed in this section, indeed throughout the state, because the ground has been too hard for horses to be used in the extremely hot weather. Farmers could come to the fair because they could not plow.

Luck played into the tractor man's hands. After Thursday's hard plowing on the dry field came a soaking rain at midnight. Skies cleared Friday morning, but the ground of the field to be plowed was wet 4 or 5 ins. down.

The farmers themselves made the demonstration notable. The 5000 farmers Thursday didn't stand in a crowd and watch the tractors as they would airplanes. They divided into bunches of ten, twenty and thirty. The

larger groups were at the points where tractors started, the smaller ones at various places along the furrows, examining the soil, kicking the clods turned up, discussing this and that evidence of good or bad plowing. The farmers looked first at the dirt, then at the plows, and last, if at all, at the tractors. Discussions of tractors were largely in terms of the earth as the plows left it.

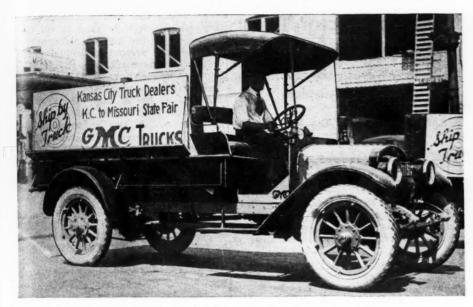
These farmers seemed of just two classes, those who had a tractor and those who wanted a tractor who were too busy to go to Wichita. Many Kansas farmers and dealers attended the demonstration.

Distributers almost unanimously declare the state fair demonstration was far and away more valuable from the standpoint of public information and consumer interest than the national demonstrations because the state fair gave opportunity for work under conditions with which farmers are familiar and to farmers who will buy from the distributers and dealers represented. The number of farmers who saw the demonstration was beyond what would have been necessary to compensate for the comparatively small expense incurred by distributers and dealers.

Not Valuable for Contracts

The event was not considered as valuable for making dealer contracts.

About half the farmers who watched the demonstrations consider the event a failure. The Missouri farmer has only awakened to the tractor during the last few months and he is not bashful about telling what he thinks of it. The farmers did not pay much attention to the tractors themselves either in display tents or on the field. They looked at the equipment and at the work being done by the belt and behind the tractors in the fields. The farmers criticised fast plowing whether the plowing was well done or not. They



One of the trucks that made the trip to state fair



The Cletrac had an exhibition of plowing in front of its tent

criticised poor plowing, and the tractor was queered in their minds if the furrows did not look good or the stubble was not all turned under. They seemed most exasperated with the tractor operators who made frequent stops, whatever the reason for the stop may have

Several distributers agree with the farmers, the Missouri state fair method of demonstration is not satisfactory. O'Maley of the Fordson suggests two days continuous plowing or all-day plowing two days and is said to favor all-day plowing every day of fair so that 15,000 instead of 4500 farmers

have time to watch more of the tractors. Wilsey of Wallis Cub suggests 50 hrs. non-stop plowing. The farmers want something of this kind. The farmers are a lap ahead of the dealers, as indicated in the sale of perhaps 100 tractors during state fair week. Only 15 percent of tractors shown were shipped back, the rest being delivered to purchasers besides the orders taken for later shipment.

The demonstration marks an epoch in Missouri agriculture. This state is thoroughly sold on tractors and has been so sold in the last three months. A year ago there were five tractors at the Missouri state fair; two or three little tractors fiitted around the grounds, rather part of the sideshows than of the agricultural exhibits.

Yesterday and today tractors were easily the feature of the state fair. The fleet of Army tractors alone would have made tractors the leading incident of the fair; ten tractors, in tents and demonstrating, would have made the fair a success. But there were not ten, but twenty different makes of tractors on display, nearly thirty plowing, disking, seeding in the fields.

Simultaneous ship-by-truck expeditions from St. Louis and Kansas City met in Sedalia, August 15, for ship-by-truck and goods roads day at the fair. The good effects of the expedition were far beyond expectations. It is evident that a co-ordination of truck-use efforts in the state is being brought about.

Staged by Truck Dealers

Both expeditions were arranged by the truck dealers of St. Louis and Kansas City. In St. Louis the dealers' association and the chamber of commerce cooperated, largely through Robert E. Lee. secretary of the former and assistant secretary of the latter, general manager of the St. Louis expedition. The shipby-truck slogan and emblem of the Firestone Tire Co. was used, and Firestone men assisted; Goodrich and Goodyear also co-operated, sending trucks in the caravan. In Kansas City the truck dealers were organized for the expedition by R. J. Fredman, manager of the shipby-truck and return loads bureau in Kansas City, and R. T. Smith, manager of the truck tire department of Firestone there.



The groups did not follow the tractor across the fields to watch them plow—they stopped to examine the results

The Kansas City caravan included twenty trucks; all new trucks taken off the sales floors, only one of each make. Four were equipped with giant pneumatics. All but one of the trucks were loaded—a Maxwell chassis going along for delivery to a dealer en route to Sedalia.

All were 2-ton trucks, and all had 5000-lb loads. Eighteen had flour, a total of 400 bbl, to be delivered in Sedalia, One truck had 5000 lbs. of coal for the bakery. Freight shipments from Kansas City to Sedalia usually take a week or more. Deducting time in the arrangements for a parade in Kansas City, the delivery of flour and coal was less than 12 hrs. Freight rates were charged for the delivery. Distance covered was 112 miles, leaving Kansas City at 7:30 a. m., Thursday, making stops of 20 min. to an hour in fourteen towns, reaching Sedalia at 7 p. m. The route was over good dirt roads, with three miles of skidded badly. A tire service car with high-pressure pump went along, but its services were not needed.

The St. Louis caravan includes twenty-five trucks of one and a half to five tons, nearly all carrying loads, some of the loads being merchandise to be delivered. No charge for hauling was made. The caravan, parked overnight, left St. Louis at 5:30 Wednesday morning, traveled 151 miles over wretched roads and steep grades to Jefferson City, 69 miles Thursday to Sedalia at 5 p. m.

The St. Louis group selected, designedly, the worst route to Sedalia, the Southern highway, a route described and well known as, in the words of R. E. Lee, "Impossible, impassable and imperceptible."

Gas Service Provided

The only special advance provision made along the route for emergency service was notice with reference to gasoline. Otherwise conditions were as any truck operator would arrange. Each driver had his own tools. Widely varying conditions as to the different trucks provided numerous instructive features for dealers and prospects. The brand-new Kansas City trucks starting without limbering up, got through like veterans. In the St. Louis caravan was a 1909 Packard 5-ton, affectionately referred to as "Grandma," and a 1919 Packard 5-ton. Four new Traffic trucks went loaded, one carrying a Traffic truck. Goodyear, Goodrich and Firestone trucks with special road-demonstration signs were in line.

Holcomb Tractor Tests

Attract 25,000 Farmers and Their Wives to Trials Under State Auspices

Largest Crowd at Any Eastern Demonstration

HOLCOMB, N. Y., Aug. 22—The tractor demonstration in which fuel, speed and general performance tests were conducted by state authority, with records to be published through the county farm agencies, attracted 25,000 farmers and their wives to this town last week.

The attendance, said by veteran tractor men to have been the largest at any demonstration ever held in the East, was almost 100 per cent of the class actively interested in tractors. Located 3 miles from the nearest railroad and much farther from the western New York population centers, the demonstration farm was too remote to draw mere spectators. Farmers came from three counties, with the result that approximately 2000 motor cars were parked on the field each day, and tractor distributers and dealers were present from fifteen counties.

The Holcomb demonstration was the second power farming demonstration to be held in New York State this year. The first was held at Utica and the third and last will be held at Potsdam Aug. 27-28. These two-day demonstrations replace the one-day tractor demonstrations staged in almost every county of the state last year under the same direction and which, while far from being failures, failed to put over the power farming idea as effectively as the ones that have been staged this year.

The state demonstrations this year have been arranged by Fred G. Behrends, state superintendent of farm machinery, who also was in charge of last year's demonstration, in co-operation with the county farm bureaus and the tractor, implement, and farm power manufacturers. The Automobile Club of Rochester took an active part at Holcomb. Hundreds of arrows were placed along the highways several weeks previous to the event, pointing out the way to the demonstration ground. Hundreds of posters were distributed and letters sent to all farmers in the dis-

trict. Since the Holcomb demonstration was arranged to take in all New York west of the city of Auburn, this was a rather pretentious undertaking.

That all this work was not in vain, however, was shown by the fact that a conservative estimate of the number of people on the grounds the first day placed the total at 15,000, while on the second day the attendance was easily 10,000—some estimated 12,000. There is no doubt but 25,000 witnessed the Holcomb demonstration. Actual count showed 2500 motor cars parked on the grounds the first day and 2000 the second.

It would be hard to determine just which was the most popular part of the demonstration, the tractor tests or the exhibits of power conveniences for the farm and home. These exhibits were arranged in tents and included everything from power sewing and washing machines to electric lighting systems for the farm home, and it was noticeable that it was the women who were the most interested in these conveniences.

Tests Second Day

The real tractor tests came on the second day of the demonstration when the machines were set to plow a rather hilly stretch of hard ground, in which were innumerable roots of alfalfa, a condition that tractors dislike as well as horses. The machines that entered and finished in this test were the Fordson, the Titan, the two-bottom and three-bottom International, the Waterloo Boy, the Cleveland, the Emerson-Brantingham, the Moline and the Case. It was a real tractor test under conditions that exist on few farms in New York state and was watched with interest by thousands of farmers, who followed the furrows, measuring and comparing the depth of furrow and the work of each machine. While for the smaller machines it was laborious plowing, none of them failed, and as a whole the farmers were satisfied with the test.

Strict rules governed the demonstration as far as the dealers were concerned, and the strictest of these were applied to advertising. Each tractor was allowed one sign stating its make and rating and the rating of its plows and discs, but no signs were allowed on the plot. Circulars and literature were allowed to be given out freely, but no spectacular methods of advertising, such as the use of airplanes, etc., were allowed. Sales were allowed to be and were made at any place on the ground. Each day at noon addresses on power farming were made.

PANHARD NOW APEX

Grand Haven, Mich., Aug. 22—The Panhard Motors Co. has changed its name to the Hamilton Motors Co. and its product will be known as the Apex truck. The change was made at the request of Panhard Levasser Co., Paris. France. The 2½-ton model formerly \$2,350 has been raised to \$2,475.



Tented exhibits at the power farming demonstration held at Holcomb, N. Y.

Service Profits Depend On:

THE ORGANIZATION

Relation of Service Department to Dealer's Business as a Whole

THE lesson of the large distributor or dealer who has a good service organization and adequate facilities to back up and augment its sales department applies equally well to the small dealer. Just because a concern is small and does not do a large amount of business is no sign that it should not be just as complete on its own scale as a larger institution. It is the ability of an institution to handle its business with dispatch that counts in these days, and the person who realizes this and prepares for it is the one whose business will increase in volume.

A definite relation exists between the service department and the other departments of an automotive concern. Of these the most closely linked are the sales and service. Each is helpless without the other. It takes the sales department to sell a vehicle and the service to keep it sold. Every automotive manager should keep the thought foremost in his mind that nothing puts more backbone into the name of a car than quality service.

Quality service cannot be rendered without an organization that understands service and knows how to translate these ideas of service into action.

One of Major Problems

To gather a competent organization, keep it intact and up-to-date is one of the major problems confronting the service station operator to-day. Both of these points are about of equal import and some provision should be made in a business system to take care of seeing that they are not neglected. To keep an organization intact, the good will of the employer and proper morale of the personnel are essential. It is only by modern conveniences, good working conditions and educational efforts that these can be established.

Modern designs of service stations provide excellent conveniences for the employees, such as ample locker space, clean and light washrooms, a restroom and an assembly room suitable for having mechanical lectures and discussions. To get the better class of workmen an employer must sell the public and his employees on the idea that he is interested in the felfare of those in his employ. Many service stations have demonstrated that they get along much

By Harlan C. Skinner
Motor Age Editorial Staff

better when they get their employees interested in the business.

Good working conditions are esential to produce good work and to keep the employee satisfied. The service building should have good light, proper ventilation and clean floors and benches. It is bad practice to build a building without sufficient side lighting and overhead lighting where construction conditions permit and it is necessary on account of adjacent buildings. Where there are no adjacent buildings it has been found that 1 sq. ft. of glass for every 6 sq. ft. of floor space will give excellent lighting.

When considering ventilation for a garage, one always has the heavy exhaust gases to consider. To get rid of these and inject free air into the shop is the chief problem. In buildings with concrete columns it is very good practice to make the interior of the columns hollow and lead to the roof with some form of revolving ventilator attached to the top of the column. In the shop proper should be a hole in the column connecting the room with the airshaft through the center of the column. This hole should be about 6 in. above the floor center line to carry away heavy gases. However, exhaust gases should not be permitted to escape directly into the shoproom, but should

Service Profits Depend On

1—THE ORGANIZATION

2—ROUTING OF JOB

3—BUILDING LAYOUT

4-EQUIPMENT

be conveyed either to the column ventilators or to the windows by flexible tubing connected with the exhaust pipe of the car.

A clean shop with clean cars to work on will increase the quality of the work. On long overhauling jobs that are going to remain in the shop for several days it is best first to give the car a thorough wash and kerosene shower to remove all traces of road dirt and grease. Of course, it would not pay to do this on short jobs. But the idea is to better the working conditions and produce better work

Don't think that to sweep the shop floor once in the morning is sufficient. It is not. Keep a porter on the job and have the floor swept as fast as any dirt accumulates. It certainly pays in the long run, as it helps to create that incentive for better work.

Just one more point about shop conditions. The old idea of a common bench along the wall of a building has been proved to be uneconomical. The best bench location is to have a series of short benches between the columns and along the wall. If one can get three cars between the columns in a building, then place a two-sided bench between the columns and one singlesided bench along the wall directly behind the central car between the columns, each of the benches to be large enough to accommodate two men, as that is the number that usually works on a car. Thus the men working on the cars next to the columns have a bench to themselves, and this is also true of those working on the central car. It is obvious that an arrangement of this kind precludes the possibility of men interfering with each other in their work as is common with the old styles of bench location. A shop should do everything that it can to save energy and make working conditions as convenient as possible.

Helps If Worker Understands

Employees have all kinds of wild ideas about how a business is run. It is hard to understand why a charge of \$1.25 should be made when they only receive 65 cents per hour. They do not understand overhead. Many concerns have found it materially improved their employees' attitude towards the business if they explained some of the ins and

outs of their business. It helps the employee to understand that waste of shop material and tools lessens his value to the concern and builds up that mysterious overhead.

General mechanical meetings once every two weeks are of great value, as it enables the service manager to get his employees' ideas on how certain kinds of work should be done, and experience shows that some of them have some mighty good ideas as to how to save time on jobs. Through these meetings many very fine special repair tools have been devised by the suggestions presented. And these meetings help to pull up the weak members of the repair force and increase their knowledge of things mechanical. Surely it is a foregone conclusion that men can handle a repair much better if they understand how a unit works. Yet there are but few of the average mechanics that can explain the action of a differential.

It is a difficult task to secure good allaround mechanics, as most of them have been trained in factories and are specialists in one particular operation. This type of mechanics is not needed by the average small shop as they do not have sufficient work to warrant the employing of specialists. What they do want is general mechanics who are capable of handling all classes of repair work. Inasmuch as there is a scarcity of this type of men, the next best thing that a service station can do to collect a competent organization is to employ young men and train them.

Apprentice Is Solution

We must look to the apprentice to be the real solution of the repair labor situation. And one must offer enough to the young man to make his work attractive and then enough to hold on to him after he is trained. Perhaps in the past service managers have neglected the possibilites of the apprentice and considered him as a necessary evil instead

of looking forward.

To make the apprentice a successful mechanic he must perforce understand some of the theoretical and most of the practical whys of the various units entering into a motor car. This can be put across by a school which, of course, would have to be more elementary than the technical meetings referred to before. Some shops have handled this by having an hour's lecture each day during the working time. It is not difficult to find some one in an organization who is capable of handling such a course as it must be largely practical instruction supplemented with shop practice on actual units.

While these means to gather an organization may seem impractical they are actually being used by quite a few concerns to build up their personnel for future work.

In handling service work the actual structure of the organization, the division of work and the placing of responsibility are vital. This subject is taken up quite fully on page 27, and it will not be necessary to go into this phase of it in this article.

Georgia Revamps Fees

More Revenue Will Go to Road Maintenance and Construction in State

System of State Highways Is Outlined

TLANTA, GA., Aug. 22-The re-A vised motor vehicle law just enacted by the Georgia legislature provides that more revenue from this source shall be spent in construction on and maintenance of a system of state highways or to be used as a sinking fund to liquidate bond issues that may later be issued to build state highways. The money will be spent by the recently authorized state highway commission in the several counties of the state according to the number of post roads in each county.

The license to be paid under this law, which becomes effective Jan. 1, 1920, for all motorcycles will be \$5; cars not exceeding 23 hp., \$11.25; cars of more horsepower 60 cents for each horsepower. All passenger-carrying vehicles seating ten or more passengers will be assessed \$75. Trucks of 1 ton will be assessed \$15; 11/2-ton, \$22.50; 2-ton, \$30; 3-ton, \$45; 31/2-ton, \$52.50; 4ton, \$75; 5-ton, \$150; 6-ton, \$375; 7ton, \$750; more than 7-ton, \$1,125.

Dealers will be required to pay a license of \$50. It cannot be ascertained whether or not this will be interpreted to apply on each line carried, as at present, or not. Dealer license tags will be of different color from owner's tags.

No legislation passed by the 1919 Georgia legislature is more constructive or of more interest than that revising the state highway department and laying the ground work for a complete system of state highways. The law provides that the state highway department shall be controlled by a board of three to be appointed by the governor. They in turn are to employ a state highway engineer, who must meet strict requirements, and an attorney, who also must meet given requirements, to advise and assist them in conducting the department.

Governor Hugh M. Dorsey, who has been one of the foremost good roads workers in the state, has let no grass grow under his feet. Within a few hours from the time the bill was enacted and effective he had appointed Prof. Charles M. Strahan of Athens, Samuel Y. Austin of Lagrange and Standley Bennett of Quitman as members of the board, serving two, four and six years in order named. This department will have the power to make all preliminary surveys, maps, investigations, etc., and to locate, supervise, construct and maintain a system of state aid roads, not to exceed 4800 miles.

The bill requires that the effort shall

be made to serve as large a territory and as many traffic centers as practicable under the system, which provides that cities must be connected by at least one state aid road. Counties will be reimbursed for roads already constructed upon the approval of state highway engineer. Trunk routes will be established between the larger centers as continuations of national highwavs.

The department has full power in highway construction. Funds have been provided for by appropriation and by the motor vehicle license law, but an amendment to the constitution authorizing a bond issue of \$50,000 for highway construction will be submitted to the people in the general election in 1920. A bill providing for this was passed by the senate at the recent session, but action in the house was postponed owing to the fact that there will be another session before the amendment could be submitted to the people. Straw votes in the house showed the bill would have passed by an overwhelming majority had it reached their body before the end of the session.

The splendid results accomplished at this session of the general assembly were due chiefly to the concerted efforts of the State Automobile Association, the State Dealers Association and the numerous city trade associations.

INTERSTATE ELECTRIC EXPANDS

New Orleans, La., Aug. 22-The Interstate Electric Co. has announced plans for the construction of three business buildings in as many different sections of this city, involving an expenditure of \$1,725,000. In addition to this, Percival Stern, president of the Interstate, which is one of the largest firms handling automotive equipment in the South, announces that the company had purchased the two-story concrete building adjoining its present headquarters and that the building will be occupied by an exclusive export equipment branch.

Of the three other buildings to be erected immediately, one, a three-story structure, costing \$45,000, will be used exclusively for battery and tire service; another, ten stories, is to be office building and general headquarters; third will be a fifteen-story structure on the site now occupied by the United States Rubber Co. Work on this lastnamed building cannot be commenced until Jan. 1, 1920, as the present lease does not expire until that date. Work on the others will commence at once.

NELSON MAKES IMPROVEMENTS

Saginaw, Mich., Aug. 22-The Nelson Motor Truck Co. has increased the rating of the Jumbo model D from 4000 to 5000 lb. and has made several improvements, including a new lubricating system. The chassis price has been increased from \$2,500 to \$2,700. Two new models will be announced soon, 11/2 and 31/2 tons, each to be supplied in three wheelbase lengths.

Organizing the Service Station

Division of Work in Different Types of Repairshops According to Size

E VERY organization, no matter how small, should know how it is divided within itself and what the duties of these subdivisions are. This is a very important subject for service stations, as good service is dependent largely upon unity and co-operation. Structural layout definitely places responsibility. A business concern that is always at sea as to who should do this and who should do that never gets anywhere. These various duties are best represented graphically.

Throughout the country there are many different types of repair stations, ranging from those that handle just a few cars per day to those that service

several hundred per day. For the purposes of illustration we will divide these types as follows:

1-Small repair stations

2-Medium repair stations

3-Large repair stations

Each of these three types of service concerns require a different type of organization to handle its business. As the volume of business grows the number of departments and the structure of the organization itself become more complex. Hence it is absolutely necessary that the duty of the various departments making up an organization be defined clearly.

A small service organization such as

is usually found in the average small town is in Fig. 1. As the chart shows, this is not a large organization, yet its fundamental structure is the same as that of a larger organization and each member of this smaller organization is a very important cog in the service machine.

The tester assistant plays an important part in this simple organization, for he makes it possible for the foreman to be always on the job and not riding around leaving the shop to run as it will without supervision. The tester does all the riding, testing and tuning. That's his job, and he leaves the foreman free to meet customers and handle the shop. A tester is an element in the small shop organization often not found and accounts for many of the troubles of such

In the medium repairshops with a larger volume of business than the organization outlined in Fig. 1. more of an organization is required to handle it efficiently. Such an organization is shown in Fig. 2 and consists of a service superintendent, a service man to meet owners and drivers and issue shop orders and handle shop records, a tester, a stock and toolroom assistant, a shop foreman and the mechanic.

An organization of the character as shown in Fig. 2 easily is expanded into a larger organization similar to the one shown in No. 3. This latter chart shows the £rrangement of the personnel necessary for the largest type of shop where a ceach shop has been added to the organization shown in Fig. 2 and the repairshop itself departmentized.

Not a One-Man Job

In large shops of this kind the work becomes of such volume that it is no longer a one-man job, hence it is necessary to have a foreman for the various sub-divisions of the main departments making up the entire organization. This expansion has made necessary the addition of several testers and also some foreman in the repairshop proper, where the work has been sub-divided into the engine group and chassis group. An organization as large as this usually maintains a coach or paint shop, which, of course, will necessitate having a foreman in this department, as these men are usually highly skilled in their trade.

These three graphical studies of repair organization give one an excellent idea as to where to place responsibility for the proper operation of the various departments making up the organization as a whole. Such charts are of vital importance to the average garage owner, as they enable him to bring the structure of his organization to the various individuals in it in a much more forcible manner than would be possible otherwise.



Fig. 1—Small repairshop organization, showing division of work and principal members of personnel

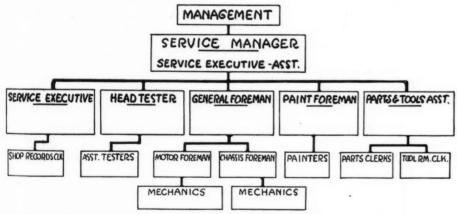


Fig. 2—The average city of 5000 population has a service organization similar to this

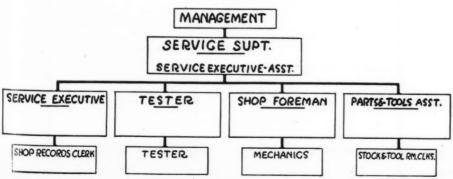


Fig. 3—Fundamentals of medium organization expanded to handle a large volume of repair business

Garage Dlanning Service Station Arrangements

No. 95

Suitable for Corner Location

Q—Furnish plan of garage building best suited for corner location 75 by 100 ft., no alley. Repair department and accessory department will work two mechanics and carry stock of about \$2,000, probably have sub-agency Buick, carry one car at time. Want to house most cars possible conveniently.—City Garage & Supply Co., Alvinx, Tex.

You do not say which is the main street or which corner you have. If we have guessed wrong on the corner, the plan can be reversed. The showroom placed as it is in the corner is equally well suited to either frontage. If the frontage is the long way of the building, it might be advisable to put the repairshop at the end and have no entrance there.

Perhaps we have used more space for the office, showroom and accessory department than you would wish but you could not condense it enough to get in more than about two more cars, and if you did this your quarters would be so cramped as to be unattractive.

The temptation, having a lot with these proportions, is to take away a garage space of 50 by 100 ft. as being very good garage proportions and place all the other departments in the 25-ft. strip left. But, of course, if the street at the side is not the main street that would not work very well, so we have compromised somewhat.

No. 96

Shop and Arrangement

Q—I have a building 50 by 80 ft. with 30 ft. partitioned for parts and accessories and the other 50 by 50 for storage and shop. I am letting contract to add 50 by 60 ft. on the back of the building and am going to put the following equipment in shop: Burning-in stand, engine stand, ar-

DENCH

LINE STAFT

LINE STAFT

CONSTRAINED

DENCH

CONSTRAINED

DOWNERS

BANKING IN

SHOD

ARLISTAND

ARLISTAND

ARBOR

OUER HEAD

CLEANING TUB

STOCK &

TOOLS

TOOLS

FEETO

SID IS 20

Shop and its arrangement

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquirers are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

bor press, bushing driver, drill press, buffer, wheels, line shaft hangers, pulley, 10-h.p. electric motor. A little later on I may add a little more equipment, also have H. B. battery charger.

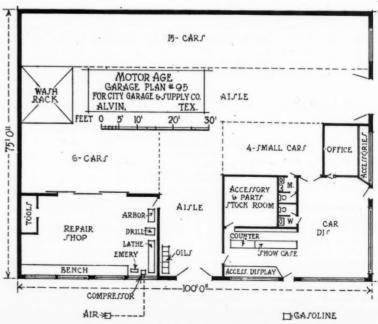
I will certainly appreciate it if you will plan to go by telling me how much to cut off for a good shop with this above equipment, I also want to have shower bath for the boys. I am in a small town of about 2000, but it is a good one. Three of my boys buy the Motor Age every issue, and I am a regular subscriber. I would like you to tell me the best way to put windows in the building for the best light.—Sam P. Hale's Garage, Davis, Okla.

Our layout speaks for itself in the way of arrangement of machines, etc., our idea being to get the power-operated machines all in two rows as in ordinary machine shop practice so they can be run from a single line shaft with the minimum of overhead loss.

Most Ford service stations do not bring cars into the shop proper but remove the parts wanting repair in an adjoining room. From here they are carried very easily on an overhead conveyor to the shop, if they are too heavy to be moved by hand.

Engine stands, axle stands and all other labor-saving devices are placed in the line of the conveyor so heavy lifting is avoided.

The question of windows always is linked with local conditions, so it would be hard to tell just what would be best for you. You will make no mistake if you install some skylights. The center of a building of this size is always dark even with large windows all around. It has become almost universal practice in Chicago to place them about half way from the center to the side walls. There is a skylight between every two trusses, but they are alternated first on one side of the building and then on the



Garage building suitable for corner location

other. If you light this way, it makes no difference what is around you, your light cannot be shut off.

No. 97

Is Planning Woman's Garage

Is Planning Woman's Garage

Q—We are contemplating the building of an exclusive electric car garage 90 by 100, two stories with repairshop for electric work and battery work on the second floor. It is our aim to have two washracks and to have two entrances, one for exit on the south wall and one for entrance on the north wall, with office in the front between openings. Further in the construction of this building it is our desire to have approximately a 3½ ft. back stop from the wall with an 8-in. drop with as small columns as possible, preferably iron.

The office, as you, will note, is 24 by 38, and I have enlarged same in the center of the drawing. The main part of the office will be for the show cars and the office part inclosed by brass railing. We have two doors entering into the garage and one sliding window for the issuing of instructions to the garage employes.

I have shown in the center on the left side of the main garage a 4-in. curbing which would stand between the wheels of all cars, with a very slight slant to the rear for the collection of acid, water and other matters that would drop from thacars. At the head of the curbing would be left a small place for brass name plate for the name of owner.

There is to be a rear entrance into our building now known as Blackstone No. 3 with this electric garage, which will be an addition to this building in the shape of an L. There will be two dressing rooms as shown on the extreme right of the plan, with shower bath.

Further, it was our idea that in building this, for the purpose intended an arch ceiling of white tile would not only be clean but, inasmuch as this is to be a ladies' garage, it would be very attractive. Further, it want to put in a system for distilled water for flushing the batteries by putting the tank on the second floors with the take-off between column.

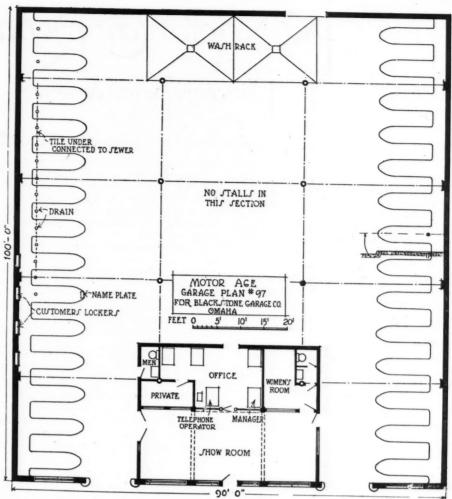
With the information that I have given you, would be pleased to have your ide as to the planning of this, as we have nothing of this sort in Omaha, and it is hard to tell just exactly

If you carry out the white tile idea in this garage, you will have a beautiful place and one that will be irresistible to women, which is your desire.

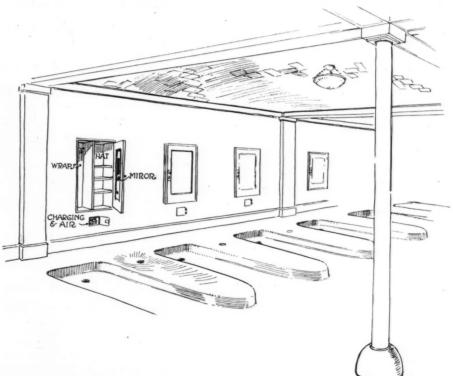
We have added a few feminine touches which probably will appeal also. Individual lockers back of each car arranged somewhat as shown in the perspective sketch with mirrors either inside the door, or otherwise, conveniently placed. An electric light also would be placed in this cabinet, operated by a door switch, so that her ladyship could arrange her hat at the preser angle, etc.

this connection we believe it might be advisable to install the generator and panel either in the old building or on the second floor, if you have one. Women as a rule are adverse to machinery and do not appreciate the hum of a dynamo any more than that of a bumblebee.

Inasmuch as you are catering to women, you can't make it any too agreeable for them. You should have an especially attractive waiting or restroom. The one we show is only a makeshift and should be a lot improved both in size and appointments. Why not locate it above the office and



Garage planned especially for catering to women



Details that make for convenience of women in electric garage

showroom, even though you don't build a second floor over all? A stairway could lead up where we show the pres-

ent waiting room. Put in a small piano, some comfortable chairs, a couch, some (Concluded on page 30)

The Motor ar Repair Shop Practical Maintenance Hints

Equipment for Making Radiator Repairs

N THE monufacture of radiators most of the equipment is special for the particular type of radiator a company produces. This equipment is necessary for repair service:

1—A tank approximately 6 ft. wide by 5½ ft. long and about 14 in. deep, which probably would take the largest radiator made, is necessary for testing.

2—Air pressure of 12 lbs. is necessary. A compressor should be provided for this purpose.

3—A gas torch is necessary for soldering, loosening or removing damaged sections of the radiator.

4-A gage should be provided on the air line to show the pressure used in

testing radiators, which pressure should not exceed 8 lbs.

5—An iron face plate, as we term it, or in other words, a table with an iron top 3 ft. square and about 2½ ft. high, is necessary in assembling and disassembling radiators.

Miscellaneous tools are required, such

6—Acid pot—we use muriatic acid for removing rust and cutting acid for cleaning preparatory to soldering.

7-Wire brushes for cleaning off rust.

8-Metal snips, or shears.

9—Weaver pliers for straightening core material.

10—There should also be provided a quantity of rubber plugs varying in size

from ½ to 4 in. diameter, in ¼-in. sizes, for closing openings in radiators when testing with air. As a substitute for this thin sheets of metal may be soldered over the openings and removed when the work is done. The only danger with this practice is that sometimes the metal is not removed from the overflow pipe, thus causing damage.

11—In addition a gas firepot is necessary for heating soldering irons.

It is a difficult matter to give information pertaining to the repair of radiators which could be put into general practice, owing to the many different types on the market, and the safest way would be for an operator to gain practical experience in this line.—McCord Mfg. Co.

GARAGE FOR WOMEN

(Concluded from page 29)

plants and ferns, a bookcase with a few late magazines and good fiction, and after it is complete take care of it, keep it clean and neat.

The washracks we have taken the liberty to move to the center space at the rear where they will be accessible to both aisles and when not in use form a passageway between the aisles. The arrangement leaves both complete sides for the use of regular individual renters, leaving the center for transients and service customers.

You suggest pitching the top of the stall curbing to the rear. Would it not be better to put a drain on each curb and also one in the floor of each stall as indicated. They would not cost much and would keep the floor always dry. As electrics seldom have much overhang aft, 30 in. would be wide enough for the backstop with room to spare.

Returning to the white tile proposition, we suggest you investigate white glass, especially for the ceilings and side walls. It is less expensive. You probably will have to use white terra cotta for the beam coverings. The smallest and strongest columns are those made from steel pipe and filled with concrete. We believe you could get these pipes from the makers and have them white enameled by a bathtub enameler and filled with cement afterward.

White enameled brick for the side walls would be fine, but be sure they are the best quality. The enamel, like the glaze on white tile, is prone to chip off in time unless the base is extremely hard-fired.

Our technical men tell us your idea of piping the distilled water is not

good. Distilled water has a strong affinity for iron or any other metal except lead, and after laying in the pipes would be detrimental to the batteries. A cart carrying a tilting carboy would fill the bill.

Instead of air hose reels to muss up the ceilings of this immaculate garage, install the air outlets along with the battery charging outlets in a small box with a white enameled door immediately under the lockers. A piece of air hose could lie along the wall on the backstop without being noticed and would always be handy.

If you want to be high class, do not install the instruction window in the office. Have a 'phone or two in the back of the garage for instructions.

AUTOMOTIVE CORP. TO BUILD

Toledo, Ohio, Aug. 23—The Automotive Corp. has purchased a site and will build a factory at once for the manufacture of farm tractors. The company plans to begin work on a building 90 by 300 ft. shortly. Officers of the company are: President, A. H. Wyatt; vice-president, George G. King; secretary and treasurer, William Hulin.

TRUCK SALES MANAGERS MEET

Chicago, Aug. 23—It was decided at a special meeting of the board of directors of the National Association of Motor Truck Sales Managers last week that the first annual conference of the association be held at the Hotel Statler, Detroit, Nov. 7 and 8. At the meeting a report of the National Motor Truck Development tour under its auspices, will be made. J. C. Ayers, Derby Motor Truck Co., will be in charge.

RACE FROM SIDELINES

(Concluded from page 12)

did this bit of data tell the crowd? So next year let's handle it this way. If the officials don't know how to figure the miles per hour for different times and different laps then hire someone who knows to plot some time, disstance and speed curves so the announcer can tell the crowd something interesting. The crowd doesn't want to hear dry time statistics, but they want human interest stuff.

And then it might be a good idea to connect up the scoreboard to the timers' stand with a telephone or else leave it off the field and save disappointing the crowd again. Let's don't forget this next year and let's also have a couple of days' practice with this board so the board operators can get down correctly the information that is given them.

The results of this year's race teach us that we will have to do these things to have a successful race next year:

1—Accurate and reliable timing methods.

2—Some rapid and accurate method of checking laps completed by cars.

3—Proper communication between timers' stand and the scoreboard.

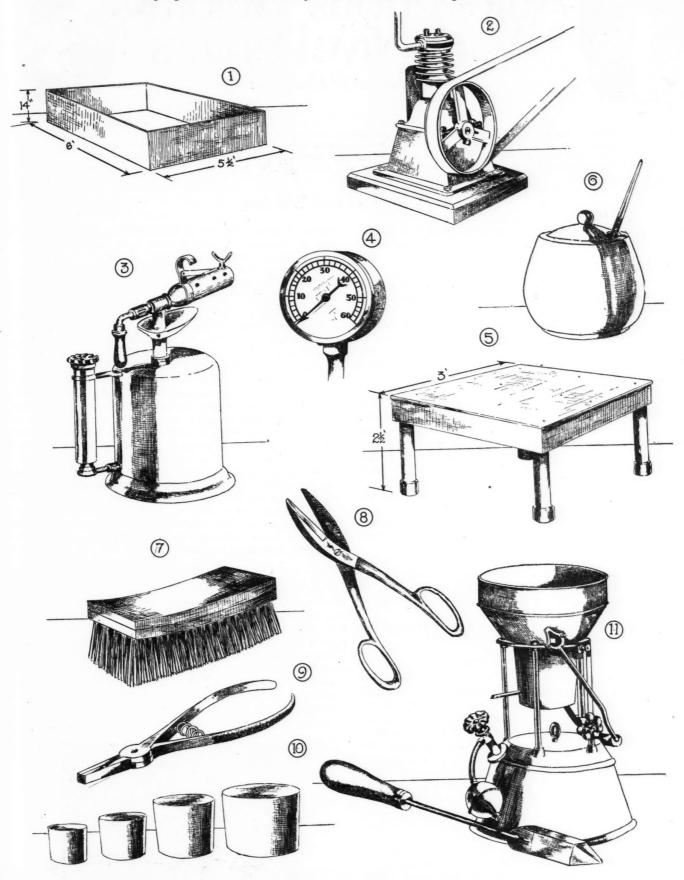
4-Proper communication with the various stations around the course.

5—A good hard-surfaced smooth course with safe turns.

KELLOGG INCREASES CAPITAL

Rochester, N. Y., Aug. 25—The Kellogg Mfg. Co. has increased its capital from \$75,000 to \$300,000. The increase is to provide sufficient capital to take care of the demand for pumps and the company will expand so as to make more prompt deliveries.

Equipment Necessary for Radiator Repair Service





utogenous Welding Automotive Repairs

By Thomas P. Bowman

This is the tenth installment of a series of articles that are to be published in MOTOR AGE each week. The author has had practical experience in motor car repairshops which enables him to present first-hand information on practical welding in a clear and concise manner. No difficulty should be encountered in this work, provided the reader will apply all the methods given herein.-Editor.

Part X-Steel and Welding

TEEL is one of the purest forms of iron. It can be molded, forged or drawn into any desired shape. It usually contains about 98 per cent or more of iron. The principal constituent of steel, after iron, is carbon. It is present from almost nothing up to 1.5 per cent. As in cast iron, the carbon plays an important role in the properties of the metal.

Wrought iron is almost the same as a very low carbon steel. It is never cast but is always forged. The process of its manufacture is different, however, in that it is finished in a pasty rather than liquid condition, and there is always 1 to 2 per cent of slag in it. From the standpoint of welding it can be considered as a mild steel.

Carbon is dissolved in the steel and is never free from graphite. The carbon exerts a hardening effect on the metal, which increases with the carbon content. Carbon also increases the tensile strength up to about 1.2 per cent, where it begins to lower it. The ductility decreases very rapidly from 5 to 15 per cent carbon. From there on the decrease is more gradual.

Silicon has very little effect on the strength of steel. Its principal property is that of producing soundness.

Sulphur lowers the strength and ductility of the metal. It also produces red-shortness, which causes checking during the working or casting of it.

Phosphorus produces brittleness and weakens the metal with respect to shock or vibrating stresses. Manganese increases the tensile strength of steel when it is present above 0.04 per cent. Its effect is dependent on the amount of carbon present.

Oxide of iron does not have any great effect of the strength of steel and does not affect its ductile properties.

WELDING OF STEEL

. Steel melts at 2500-2700 deg. When molten it is not extremely fluid. At dull red heat it begins to oxidize very rapidly. The oxide, which melts at a temperature of several hundred degrees below that of the metal, remains at the surface and can be removed easily. A flux is not necessary. Close attention must be paid to its removal, however, for its presence is very harmful. It is a common fault to have layers of oxide in the weld, which cause a laminated structure that weakens the weld seriously. Steel does not melt rapidly. It gradually comes to fusion, confined to small areas. Because of this the weld is made up of small overlapping layers. The strength of the weld depends greatly on the thorough bonding of these layers to each other and to the beveled edges of the piece being welded. It is a common fault to force the metal ahead of the welding area and allow it to adher to the cold sides of the beveled edges. should be avoided, as a weld is not produced.

A welding rod of pure iron wire generally is used. Occa-

sionally a nickel steel rod is used with good results on such work as crankshafts, etc. A mild steel rod is particularly satisfactory on steel castings.

Thickness of steel

Steel is very sensitive to the blowpipe flame. An excess of acetylene tends to carbonize the metal; an excess of oxygen tends to oxidize it. Therefore, a neutral flame should be used always and it should be tested frequently in order that it be kept in proper adjustment.

Failures due to expansion and contraction are not numerous because of the toughness and strength of the metal.

If expansion and contraction are not taken care of, however, warping and buckling surely will take place, and internal strains will exist in the weld. These can be avoided by setting up the work properly and with proper preheating methods.

The strength of a steel weld can be improved by mechanical treatment. Hammering is the most common method employed. After the weld has been completed, the entire weld should be heated to a bright red heat and the hammering carried on at this temperature. If the hammering is done at a lower temperature than this, the weld will be weakened instead of strengthened.

CAST IRON

Cast iron is brittle. It cannot be rolled. It is, therefore, necessary that it be cast into the desired shapes. There are two general classifications of commercial cast iron, called gray iron and white iron. There is an intermediate stage known as mottled iron. The difference between gray and white cast is the nature, or state, of the carbon present. In gray iron the greater portion of the carbon precipitates as graphite. In white iron the major portion of the carbon is combined. The color of gray iron is due to the precipitated graphite. White iron is hard and quite brittle. Gray iron is softer and tougher.



Fig. 36-Good weld in steel



Fig. 37-Poor weld in steel plates

Cast iron contains other substances, such as silicon, subshur, phosphorus and manganese. These all have certain effects on the properties of the iron. Silicon is used to soften the iron, since its presence aids in the forming of graphite carbon. Manganese has the reverse effect. When present in quantities of more than 0.4 per cent it causes the carbon to remain in the combined state, although below this quantity it is somewhat beneficial as it counteracts the hardening actions of sulphur. Phosphorus increases the fluidity of the molten cast iron. Above 1 per cent it weakens the iron. Sulphur causes the carbon to combine with the iron, thus increasing the hardness and the brittleness. It also has a weakening effect. It should never be present in quantities of more than 1 per cent.

EFFECT OF COOLING

When cast iron is melted and cooled quickly the carbon does not have a sufficient length of time to form as graphite. It remains in the combined state, which causes the iron to have a low tensile strength, to be hard and brittle. A fracture cast iron is very smooth, close grained and of a silvery luster; hence, it is known as white cast iron. When cast iron is cooled slowly, the carbon will form graphite. This produces a large open-grained iron which fractures with a rough granular surface. It is soft, can be machined readily and is gray, due to the graphite present; hence, it is commercially known as gray cast iron. Except in very rare cases where hardness is desired, the aim of the welder is to produce gray iron.

PREHEATING

All cast-iron work should be preheated to some extent. The most important factor in the success of welds on large castings is the proper treatment by preheating for expansion and contraction.

WELDING OF CAST IRON

When cast iron is in fusion it oxidizes very rapidly. The oxide begins to form at a bright red heat. It melts at a temperature of 2400-2450 deg. Fahr. Since the metal itself melts at a temperature 300-400 deg. below this, it can be seen that the oxide will not be fused at the same time as the metal. To break the oxide down and allow the metal to flow together a flux must be used. A properly formulated flux will dissolve the oxide and float it to the surface, so it may be removed by scraping the molten surface with the end of the welding rod. Be sure to tap the end against something to free it from oxide before continuing to add it to the weld.

Cast iron is quite fluid when melted. For this reason it offers a little difficulty when vertical or overhead welding is attempted. Also its fluidity causes entrapping of gases, dirt and oxide. These may be removed by proper manipulation of the blowpipe and welding rod. The molten iron can be forced ahead of the weld very easily. Adhesion to the cold metal will result if the welding is not watched carefully.

The silicon will volatilize to some extent in the molten metal. The lowering of the amount of this constituent will



Fig. 38-Good and poor weld in cast iron

seriously affect the metal. To compensate for this loss, a welding rod that contains from 2.75 to 3.5 per cent silicon is used. The other substances such as sulphur, manganese and phosphorus, should be kept within rigid limits. The welding rod should be soundly cast, free from dirt, sand, scale rust, etc.

The welding flame always should be neutral. The flame should be applied to the weld at such an angle that the metal will not be blown ahead. Inasmuch as the metal is quite fluid when molten, the welding is carried on in a series of overlapping pools, or puddles. The welding rod is applied by placing it in these pools and playing the blowpipe around it. The welding is aided by continually working the rod in the weld in order that blowholes, dirt, scale, etc., will be forced out.

The central jet of the flame should never impinge on the molten metal. It should be held $\frac{1}{2}$ to $\frac{1}{2}$ in from it. Occasionally it is necessary to remove a blowhole, in which case the hole is burnt out with the flame and then the metal is worked over with the welding rod.

The working over of a weld should be avoided unless it is absolutely necessary. If it is necessary to do this, the welding rod should be used always, for otherwise a portion of the silicon will be lost.

When the weld is finished and it is still hot, the accumulation of scale, dirt, flux, etc., on the surface should be removed by scraping with a coarse file or other tool. This is a superficial coating that is very hard when cold. As soft welds are nearly always desired, the casting should be cooled slowly and evenly. Where the work is complicated or of heavy section it is by all means best to reheat it to good red heat and then allow it to cool. In some cases it is sufficient to allow the casting to cool in the preheating fire without the additional reheating.

MALLEABLE IRON

Malleable iron is a form of cast iron. Its principal characteristic as compared to gray iron is its toughness and ability to resist shock. It is produced by annealing white iron castings in pots or boxes, packed with hammer and rolling mill scale, turnings, borings, etc., at a temperature of 1200-1300 deg. Fahr. for 48-96 hrs. The castings are then cooled slowly.

During this annealing process the material in which the castings are packed absorbs the carbon from the surface of the casting. In this way the surface assumes the nature of steel, while the interior retains its cast-iron properties. In small castings the decarbonization may exist throughout; in the larger, the core or heart of cast iron is always present.

The Readers' Clearing House Questions and Answers

Foreign Ball Bearing Construction

Q—How are the balls put in some makes of German ball bearings. There is no visible groove in which they could be slid into the raceways.—Oscar Widerhold, Jr., Philadelphia, Iowa.

These bearings are assembled in a manner illustrated in Fig. 5. The inside race is allowed to rest on the inside circumference of the outer race. This produces an eccentric space which is larger over a considerable portion than the diameter of the ball bearings. Into this eccentric the ball bearings are placed. Then the balls are spread apart as far as possible and the inner ring slid into position as the balls are slid around the race. The retainers are then fitted in between the balls and riveted.

Gear Adjustment on Chandler

Q—Illustrate and instruct how to take up play of rear shaft bearing of transmission on a 1917 Chandler Six.

2—Illustrate and instruct how to take up play in universal joints.

3—Illustrate and instruct how to take up play in steering gear.—Charles Kammerlander, Chicago.

1—By adjustment of the rear shaft bearings we assume that you mean the bearings designated as A, B and C shown in Fig. 1. The bearings of the pinion shaft if properly adjusted generally will take up the play. The bearing A is adjusted by turning the lock nuts marked B109 and B110. The nut B109 should be turned away from the other nut several turns. The under nut then should be turned toward the

Conducted by B. M. Ikert

Miscellaneous

rear axle half of a turn and the outer nut screwed up against it. The bearings B are adjusted with the aid of the

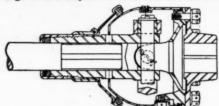


Fig. 2-Universal joint on Chandler



-Cross-section of armature

nut, located underneath the oblong cap attached to the rear of the pinion housing.

The first step is to loosen the clamping bolt. A screwdriver then can be inserted between the notches of the adjustment collar and the collar turned to the right one notch. A movement of one notch represents a lateral motion of the pinion gear of 0.004 in. If it is found that the turn of several notches does not bring the desired adjustment. the ring gear will have to be adjusted. This moves the bearings C to one side or the other. First remove the cap bolted to the rear of the axle housing. Then loosen the four nuts holding the differential in position and loosen the adjusting lock on each side of the differential carrier. If the ring gear is to be moved toward the pinion gear, the adjustment collar on the right side should be backed off two notches and the collar at the left turned on two

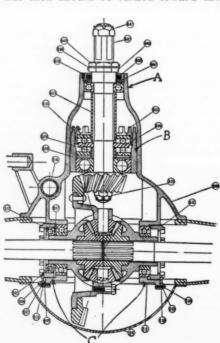


Fig. 1-Chandler rear asle bearings A, B and C

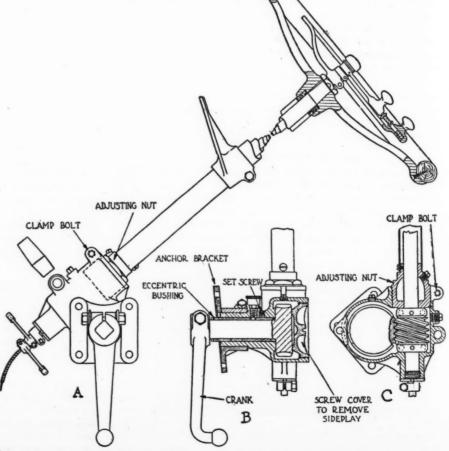


Fig. 3-Warner steering gear on Chandler, showing adjustments

notches. This will move the ring gears 0.004 in. Proper adjustment requires play of 0.006 to 0.008 in.

2—A Chandler universal joint is illustrated in Fig. 2. When play develops in the universal joint a new bronze bushing on the cross of the universal will overcome the wear. The steering gear used on the Chandler is illustrated in Fig. ?

3—Taking up the wear in the Warner steering gear is accomplished by turning the adjusting nut on the steering column and by rotation of the eccentric bushing. The adjusting nut on the column remedies the up and down motion found in the wheel, and in turning the eccentric bushing the worm wheel is brought into closer contact with the worm.

De Palma's Troubles

Q-In the last 500-mile speedway race what troubles did Ralph De Palma have with his Packard aviation engine that detained him such a length of time in the pits?

2—Why is it that cord tires will not withstand as high a degree of inflation as fabric tires?

3-What will be the approximate price of the new little Overland four?-C. B. Roy, Lafayette, La.

1—De Palma had two serious delays in the last Indianapolis race. The first delay was caused by a broken valve spring. From this de Palma lost about 12 min. The second delay was caused from a broken wheel bearing, losing about 20 min.

2—Cord tires will stand just as much pressure as fabric tires. The main difference between the cord and fabric tire is that the cord tire allows just as much resiliency as a fabric tire at lower pressures.

3-About \$845.

Ackerman System Explained

Q—The front wheels on a truck are apparently parallel and retained that way in all positions by a tie rod. If the truck runs in a circle, the inside wheel naturally will be traveling on a smaller radius than the outside one. This seems as if one front wheel is pulling sideways, or dragging the tire. Technically how is this overcome? Does it make any difference as to wheelbase? Give diagrams.—H. H. Snyder, Chicago.

If the steering gear operated as you think it does, then there would be a constant sliding action on one of the front tires, but the wheels and steering knuckles are designed to take care of this. The principle employed is the Ackerman system, illustrated in Fig. 4. It will be noticed that the steering arms are aligned so their center lines intersect at the central point of the rear axle. This alignment is independent, to some extent, of the wheel alignment, as both wheels may be cambered correctly and gathered, with one of the steering arms at a faulty angle. In moving straight ahead, this would have no effect, but in turning the wheels do not run on a true circle, so both wheels are subjected to a tire grinding. The same effect results from the tie rod being too short or toe long.

To assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

MISCELLANEOUS

Oscar Diderhold, Jr. Philadelphia, Iowa
R. W. BuhrmasterChicago
Charles KammerlanderChicago
C. B. Roy Lafayette, La.
H. H. SnyderChicago
1. D. Yager
Ray Sanders Minneapolis, Minn.
H. D. Flene Delmont, S. D.
D. C. Fiddick Cameron, Mo.
R. E. Christensen, Auto Inn Garage
Keokuk, Iowa
C. F. Cordiner Portland, Ore.
Clayton HinkleUnionville, Mo.
G. J. Blancett, Vincent's Garage
Susanville, Cal.

ENGINES

Leonard M. Smith.... Dayton, Ohio E. E. Burtz... Broken Arrow, Okla. Subscriber Johnson, N. D. G. J. Blancett, Vincent's Garage.... Susanville, Cal. N. E. Riddell... Burlington, Ky. Harrie I. Ginter... DuBois, Pa. Orville Stevens... Alliance, Neb. Reader Chicago Earl C. Cook ... Corona, Cal. Wendell M. Hunt... Whittier, Cal. W. Hein ... Ansley, Neb.

REBUILDING

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No communication without the writer's name and address will be answered in these columns.

To determine whether or not the steering connections are made properly it is necessary to know that the angle of the steering arms and the axle spindles is right and that the tie rod is of the right length. Both of these depend on the distance apart of the steering king bolts and on the wheelbase of the car. Given the wheelbase of the car and the distance between king bolt centers, the diagram may be laid out as in Fig. 4. Measuring the angles of the steering arms, as made with the axle, the correct angle the steering arms on the car should make with the car axle is found. Frequently in lining up the wheels of a car the steering connections are thrown out by lengthening or shortening the tie rod to get the proper gather. This never should be done, as improper gather is usually the result of bent wheel spindles. The tire wear resultant from bad wheel setting is obviated at the expense of a serious wear on account of faulty steer-

Reader Presents a Suggestion

Alton, Ill., Editor Motor Age—I have a car on which it is impossible to place an endless fanbelt without taking off considerable of the machinery. In fact, it would not be worth the trouble. I was bothered with the "click, click, click" of the metal joint passing over the pulleys. I tried a number of remedies, and had the garagemen try their hands, but nothing succeeded. At last, I thought of a scheme which is shown.

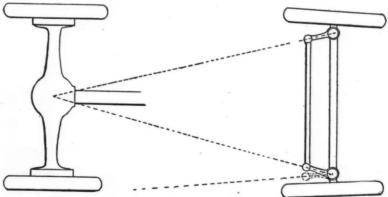


Fig. 4-Principle of Ackerman system illustrated

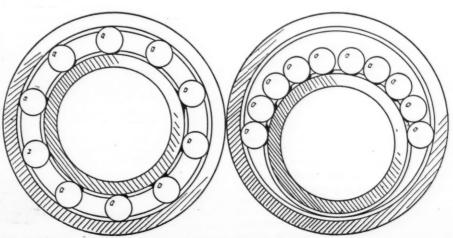


Fig 5-How foreign ball bearings are assembled

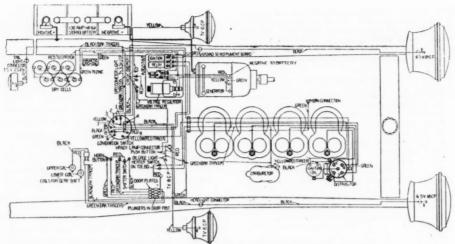


Fig. 6-Wiring diagram of late 1914 Cadillac

Fig. 1, 8 represents the fanbelt with metal joint, and on the fanbelt are four little holes made with a shoelace punch, which are marked A, B, C and D.

Fig. 2, 8 represents a strip of harness leather about the weight of heavy upper leather for men's shoes. The strip is 8 in. long and the width of the belt. The strip is to be cut along the dotted lines, and I would suggest that the strip be tacked to a soft, pine board lengthwise with tacks X and Y.

Fig. 3, 8 represents the piece of leather after being cut. All the operations are done without removing the fanbelt. Now bring the belt to a convenient position. Place the strip underneath the belt, and pull the laces through the holes, thus, F through A, G through B, after which tie the ends on the outside of the belt lightly. Then follow with E through C and H through D. Again tie but firmly. Now go to the first knot and tie tightly. The lace ends can then be brought together in the middle and made fast with the copper wire, which is tightened with a pair of pliers. We now have a leather pad securely fastened on the under side of the belt and immediately under the metal joint. There being no strain on the pad, it will not tear easily. The holes must be so placed that when the tie is made the pad is drawn against the belt securely .- L. D. Yager.

The Electric System

Increasing Generator Air Gap

Q—Explain method of increasing air gap between armature and pole pieces on generator. What effect will this have on the operation?—Ray Sanders, Minneapolls, Minn.

Unless it is known exactly what will happen when the air gap of the generator or motor is increased, no attempts at making this change should be made. If the air gap is increased, the reluctance of the magnetic circuit is increased. It is not wise to increase the air gap dimension a great deal. It can be done in either one of two ways. The diameter of the armature can be made smaller up to a certain limit and the inside diameter of the pole pieces

can be made larger. The limits obtainable by reducing the diameter of the armature should be enough for any ordinary purpose.

With a motor the effect of increasing the air gap is an increase in speed. With a generator operating at a constant speed there is a decrease in the

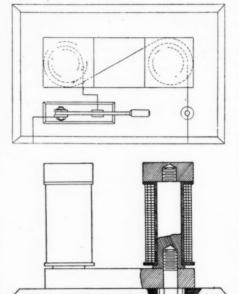


Fig. 7—Construction and wiring connection of a magnet recharger

voltage generator or, in other words, if the voltage generator is to remain the same, the speed of the generator must be increased. This latter illustration is similar in respect to the motor. The diagram in Fig. 2a gives an outline of the cross-section of the armature. The armature slots are shown with conductors in the rectangular portion and wedge-shaped fiber coil retainers at the top of the armature slot. The throat of the armature slot can be cut down a slight amount, as is illustrated by the shaded portion of the armature.

To remove this metal the armature should be placed in a lathe and a small portable grindstone fitted to the tool post. The metal can be ground off.

Magneto Magnets Discharged

Q—The magneto on a Studebaker 25, 1913, at times loses its current altogether while again it seems to run the engine fairly well. On any hard pull it will fail by switching on dry cells the engine will run at once satisfactorily. It will not run slower than 8 m.p.h. on high on level road with magneto but on battery will throttle down to 4 and 5 m.p.h.—H. D. Fiene, Delmont, S. D.

It is very evident the magnets of the magneto have become weakened. It is an easy matter to recharge magnets. Remove the magnets from the magneto. To recharge the magnets a recharger must be used. A diagram showing the instruction and wiring connection of a magnet recharger is shown in Fig. 7.

In recharging the original polarity of the magnets must be retained, otherwise the position of the magnets must be reversed. A small pocket compass can be used to test the magnet polarity, remembering the old rule that like poles attract and unlike poles repel. If the magnet is suspended from a cord and held over the poles of the magnet recharger, the attraction force will cause the magnet to seek its proper polarity. When charging the magnets rock the magnet from side to side on its pole edges several times, slide the magnet on its edges so the poles project outward slightly from the edge of the recharger with the proper magnetic contact still being made. Then place a keeper across the ends of the magnet. A keeper is a small bar of iron or steel placed across the ends of the magnet to preserve the magnetism. The keeper should remain in position until the magnets are reassembled on the magnet base. The design of the magnet re-

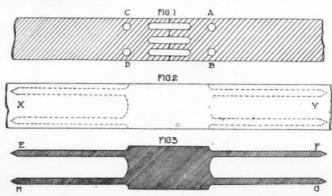


Fig. 8. How reader adjusts endless fan helt

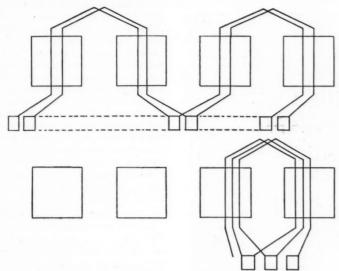


Fig. 9-Difference in parallel, upper, and series armature winding

charger shown in the illustration is a simple one and can be made easily.

The cores of the magnet are made of soft bar steel 1 in. in diameter and 3 ins. long. The cores should be secured to an iron or steel base. The dimensions for this should be about $5\frac{1}{4}$ by $1\frac{1}{2}$ by $\frac{5}{8}$ in. The top of the cores should be provided with pole pieces measuring 134 by 134 by 58 in. thick. All surfaces making magnetic contact should be perfectly flat. The layers of wire should be insulated from the core by cardboard and shellac or if fiber is available, it should be used. A tube should be made to fit over the core and fiber rings fitted to each end of the core. These rings serve as wire retainers. Before winding the wire on the fiber a fresh coat of shellac should be applied and the wire wound on while this is drying.

The winding to be applied depends on the voltage to be used. If the current is taken from a 6-volt battery three layers of No. 12 magnet wire should be used, having double cottoncovered insulation. For a 110-volt circuit eight layers of No. 22 double cotton-covered magnet wire should be used. Each layer should be shellacked and the outer layer double shellacked. The coils should be connected together as the illustration shows with the current flowing clockwise in one coil and counter-clockwise in the other. The coils as specified will heat up and burn out if left on the circuit indefinitely, and for this reason the switch should be opened when the coils are not in

Armature Windings

Q—I have noticed on a good many generators of the four-pole type that they use only two brushes, that is, besides the third brush, if there is any. It looks to me as if at the two poles where there are no brushes current would be generated in opposition to that at other two poles. I mean that, there being no brushes to pick it up, it would have to flow on around the circuit in the opposite direction to that picked up at the two brushes. Therefore, the two poles without brushes would be useless. Give thorough explanation and diagram—D C Fiddlek Cameron Mo

In any multi-pole generator it is possible to use only two brushes, provided the armature winding is what is known as the series type. On the other hand. if a parallel armature winding is used. then it is necessary to use as many brushes as there are poles, if it is desired to load the whole armature uniformly. The difference between a series and a parallel armature winding may be seen in Fig. 9. Here the armature circumference is shown in the developed form-that is, laid out flat.

Suppose the machine to be four pole. Then, in a machine with a parallel winding, if the beginning lead of a particular armature coil is connected to one commutator bar, the end lead of this coil is connected to the adjacent armature bar. On the contrary, with a series armature winding the end lead is connected to the armature bar, which is almost opposite the bar to which the beginning lead is connected. With series connection the number of sections in the armature must be odd.

Winning of 1914 American

Q—Publish light wiring diagram of a 1914, model 644 American four-passenger.—R. E. Christensen, Auto Inn Garage. Keokuk, Iowa.

The connections for the 1914 American are shown in Fig. 10.

Wiring on 1914 Cadillac

Q-Publish wiring diagram for a late 1914 Cadillac, the one that has two-speed rear axle.—C. F. Cordiner, Portland, Ore. The wiring diagram for this Cadillac model is shown in Fig. 6.

Trouble With Magneto

Q—A Curtiss airplane, here recently on a exhibtion flight, had trouble with the ignition system. This one was equipped with a Berling high-tension magneto. The engine had been working good up until this time and was working good up when suddenly it quit firing. The plane was about 2500 ft, from the ground. The machine landed safely, but the engine would not start again. There was no spark, so the magneto was taken off and dissembled but nothing was found wrong with it except that the magnetos were very weak. They were recharged, and it gave a good hot spark but only for a short time, as the engine stopped again when the machine was high in the air and only fired a coupel of shots more on the way down. A new magneto was tried next with good results. The machine has worked good The mac. What results. T ever since. machine has wo That was wrong rked good with that worked magneto?

2-What is the proper way to test out the windings of this magneto?

3—On this model E-49 Buick the lights do not work right. When the engine is speeded the lights brighten noticeably, but when the engine is stopped the lights burn

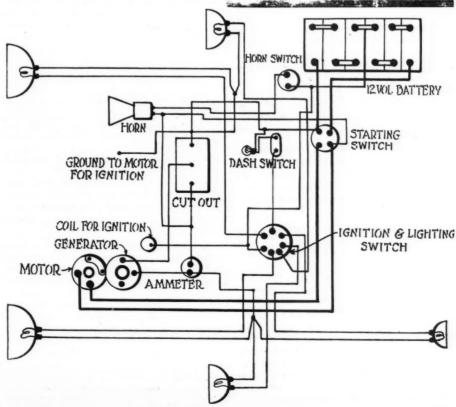


Fig 10 Wiring diagram of 1914 America

good and as bright as they should. There is a new battery on this car in first class condition. At a car speed of 15 to 25 m.p.h. the ammeter indicates from 12 to 18. What causes these lights to brighten at high car speed? Give remedy.—Clayton Hinkle, Unionville, Mo.

1-It is rather difficult to say what might have caused the magneto on this airplane to act as it did. The most obvious reason would appear to be something shorting the electromagets, or either that the low-tension winding or high-tension winding had become punctured. If the windings had become punctured, then recharging the magnets would have very little affect on the spark-producing action. punctured condenser very easily could cause this action.

The condenser, acting as a reservoir for the current which remains in the circuit when the breaker points open, absorbs this leftover, or excess, current, thus saving the contacts points. If the condenser had become punctured, the breaker points would spark excessively. would burn down very quickly, would affect the timing of the spark and would interfere seriously with the lag of the secondary current.

2-A resistance test is about the most accurate way to test the windings of a magneto. Even this test does not give one a complete idea as to the condition of the coil. First test the resistance of the primary circuit of the magneto coil and then test the resistance of the secondary coil. If it is found that the resistance of the secondary is about 1000 times the resistance of the primary, then it can be assumed the coils are in very good condition.

Variable Voltage

3-It must be remembered that the lighting system on any car equipped with a battery and generator has a variable voltage in the circuit. The voltage may vary anywhere from 41/2 volts to 8 volts, depending upon the condition of the battery, generator cutout and regulator, if there is one. It may be on this particular Buick car that the cut-out operates to connect the generator in on the line when the car speed is about 12 or 15 m.p.h. This would mean that when the engine is speeded up to this point the generator voltage suddenly is impressed on the line. At this engine speed the generator voltage is 1 or 2 volts greater than the battery voltage.

This sudden increase of pressure on the line will cause a flicker in the lamps, causing them to lighten noticeably. If it seems the lights brighten more than the usual amount, the cutout should be looked to, for the generator is charging about right and it appears that it does not need any attention. First check the air gap on the cut-out. This should be 12 in. If this is all right, then it will be necessary to check the voltage of the generator and determine at what sped the generator cuts in on the line. If it is found that relay cuts in at 8 volts and cuts out when the discharge current is 2 amp

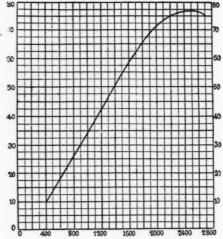


Fig. 2-Power curve of Hudson Super-Six



Fig. 12-Rotating the rings around the piston to insure proper clearance

then the air gap should be decreased. This will lower the voltage at the point of cut in. It also will increase the rate of discharge at which the relay cuts out. To overcome this the tension of the spring must be increased. If it is found the relay cuts in at 8 volts and cuts out at 1 amp. charge, then the spring tension should be decreased.

Correction of Ford Statement

Q—In your issue of Motor Age July 31, one article on page 43 in regard to charging Ford magnets states: place the compass to the left of magneto terminal, and in another article of the same issue you say: place the compass to right of terminal. Which is correct?

2—How can you test for week magnetic

2—How can you test for weak magnets when the engine is down?—G. J. Blancett, Vincent's Garage, Susanville, Cal.

1-The correct position of the compass for the Ford magneto setting preparatory to charging the magnets is 1 in. to left and 6 ins. to the rear of the terminal post.

2-If the magnets are removed from the engine, they can be tested by an ordinary spring balance. The magnets should support about two times their own weight.

Engines

Grant Horsepower Curve

Q-Publish horsepower curve of the Grant Six.

2—Would the efficiency of the car be improved by installing a Schebler carbureter instead of the Stromberg?—Leonard M Smith. Dayton. Obio

1-The horsepower and torque curves for the Grant are shown in Fig. 16.

2-Unless there is something out of order on your Stromberg carbureter and beyond repair, there should be no gain by substituting one of these carbureters for the other. The Stromberg and Schebler carbureters are both good and have established reputations for performance. It is possible that you are not getting the service from your carbureter that you should. It is possible that some sediment is causing the carbureter mechanism to stick. The carbureter should be taken apart and thoroughly cleaned and adjusted by a competent carbureter man.

Horsepower Curve of Hudson

-Publish horsepower curve of Hudson

Super-Six.

2—What is the maximum revolutions per minute of the Hudson Super-Six en-

What is the fastest time ever by a Hudson Super-Six special?—E. E. Burtz, Braker Arrow, Okla.

1-The horsepower curve of the Hudson Super-Six engine is shown in Fig. 11 2-About 2500.

3—Ira Vail, in a Hudson, at Sheepshead Bay, Sept. 30, 1916, drove the 250 miles at a speed of 97.40 m.p.h., netting him third position.

Installing Patented Rings

Q—I have an Oldsmobile 6-37 and am told it has a two-ring piston. Five of the cylinders have poor compression, car smokes and fouls the plugs, but she runs good and has good power. The question is, will good non-leaking rings eliminate the oil trouble, or would a set of fourning pistons be better?—Subscriber, Johnson, N. D.

According to the records of the Oldsmobile 6-37 produced in 1917, the engine requires eighteen rings, or three rings per cylinder. The size of the ring is 2 13/16 by 3/16 in. It many times is a question whether new patented rings will eliminate the oil fouling tendency, but when the engine smokes on five out of the six cylinders it is safe to say that new rings would go a long way toward eliminating the trouble. Any good patented ring will do. Be sure the rings are fitted properly or otherwise they are of little value when installed.

End Play in Ford Shaft

Q-What is the proper way to take up end play in Ford crankshaft?-G. J. Blan-cett, Vincent's Garage, Susanville, Cal.

There are two ways to take up this end play. The rear bearing cap should be replaced with a new cap or the old cap should be peened over with a ball peen hammer. The first method is, of course, the correct way to do the work The second method is temporary and will do as a makeshift only.

Why This Car Misses

Why This Car Misses

Q—This model N, 1916, Hupmobile which has been run about 14,000 miles has developed a miss which does not show at first. After the engine has been run and thoroughly warmed it will run along for quite a while and not miss a shot and all at once without any apparent cause it begins to miss, especially when the throttle has been open and the engine is on a pull. The engine idles nicely. The plugs are in good condition, as is the battery, and I can find nothing wrong with the compression.—N. E. Riddell, Burlington, Ky.

Trouble of this kind generally can be attributed to a faulty spark plug insula

tor. The most minute examination will not detect these tiny cracks in the insulator, but they allow the current to leak away when the engine is under a heavy load. If you will take the spark plugs apart and soak the insulators in alcohol, colored with any red India dye, you will notice that one of the cores has a crack in it, appearing as a red line on the surface of the porcelain. It is possible of course that the carbureter is flooding or the mixture is condensing in the intake manifold, but these do not appear as likely as the broken insulator theory.

Another Case of Rings

Q—A 1917 Grant Six recently was over-hauled. It has no power. New rings were installed, engine tuned up and completely overhauled. Car speed is lower than be-fore.—Harry I. Ginter, DuBois, Pa.

See the answer to E. D. Brown, Newton, Mass. It is our opinion your engine has rings fitted in a hit or miss manner.

Definition of Bearing

Q—Distinguish between a bearing, box-ag and brushing.—Orville Stevens, Alliance, Neb.

A bearing generally is understood to be the housing in which the shaft revolves. A boxing is a box which surrounds the bearing. A bushing is a small hollow cylinder which fits over the shaft or else inside a bearing box.

Lapping Piston Rings

Q-Instruct how to lap in piston rings. -E. D Brown, Newton, Miss.

1-Piston ring fitting is quite a delicate task. The majority of mechanics believe that to fit piston rings it is only necessary to slip the ring on the piston, slide the piston into the cylinder and tighten up the connecting rod bearing. This is a mistake.

Motor Age receives complaints every day from some one who has just had the engine of his car overhauled. New rings were fitted and after the work was completed it was found that the engine had less power than it had before and the exhaust constantly emitted heavy smoke clouds. The remedy for this is to fit the rings as carefully as one grinds the valves.

With the piston removed the new rings first should be placed in the cylinder before they are applied to the

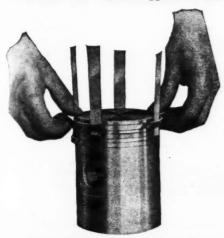


Fig. 13-Sliding the ring on with shids

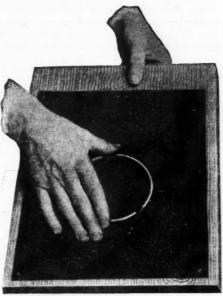


Fig. 14—Grinding ring on an emery cloth soaked with oil

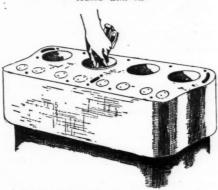


Fig. 15-Using old undersized piston to lap rings to cylinder wall

piston and filed if necessary to secure the proper gap between the ends of the ring.

If the engine has a removable cylinder head, the work is facilitated a great deal. The rings for each cylinder should be picked out and kept in a group. It is particularly advisable to use an old undersized piston to lap the rings to the cylinder wall. Slide the rings on the old piston. A connecting rod should be fitted to the piston to serve as a handle for moving the piston up and down. The surface of the rings should be coated with a thin mixture of ground glass and oil. The piston then should be inserted in the head of the cylinder in an inverted position. The connecting rod will project out at the top, making a convenient handle with which to grasp the piston.

The piston now should be worked up and down several strokes. It then should be taken out and the rings cleaned in gasoline and examined. If the surface of the rings indicate perfect contact is being made over the entire surface of the rings, they are lapped sufficiently. If not, the operation should be repeated. The rings next should be removed from the undersized pistons and placed so no confusion will result when the rings are re-applied to the proper pistons. On the small piston

the position between the ring and piston is inverted. In other words the edge of the ring which was nearest the top of the lapping piston should be nearest the bottom on the regular piston. The next step is to fit the ring to the groove of the regular piston.

Before the rings are installed on the pistons, they should be rotated around and the piston in the piston ring groove to insure a proper clearance up and down, which is about 0.001 in. This operation is illustrated in Fig. 12.

If the ring does not fit the groove properly it will be necessary to grind or lap the ring. The operation for this is illustrated in Fig. 14. Tack a very fine grade of emery cloth to a smooth board, saturating the cloth with oil. A very few strokes of the ring on the cloth is all that should be necessary. The ring should be cleaned in gasoline and fitted to the piston at frequent intervals. It is well to observe this precaution rather than grind the ring too small.

When sliding the rings into the groove care should be taken to see that the ring is not distorted due to any The rings should be placed in the grooves over skids made of three or four pieces of very thin, light-gage sheet metal, about 2 in. long by 0.376 in. wide, the rings being pushed down evenly all around to prevent any twisting. The method of using the skids is illustrated in Fig. 13.

Lowering Cadillac Compression

Q—The engine on a 1912 Cadillac has a tendency to ping or chirp when pulling a little hard even when the spark is retarded a reasonable amount and to the point where the power begins to decrease very perceptibly. It has been suggested that if a plate were inserted between the cylinder base and crankcase to reduce the compression pressure, this objection would be done away with and at the same time an increase of power would be obtained. If this be advisable, what is the proper thickness of the plate to be used?—Earl C. Cook, Corona, Cal.

A noise described as a ping or chirp is not the kind of a noise an excessive compression knock would cause. ping or a chirp is a light metallic ringing sound, resembling a squeak much more than a dull, heavy thud, this latter being the noise produced by excessive compression. A piston slap very often will produce a noise similar to the one

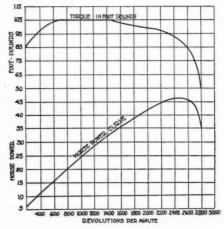


Fig. 16-Power curve of the Grant car

you describe. Connecting rods with loose bearings in the piston also have been known to make the same noise. However, if this noise seems to be produced in all cylinders, there is a likelihood the engine has a compression knock caused by the heavier fuel furnished today. In this event, inserting a plate between the cylinder base and the crankcase will lower the compression and eliminate the noise, but lowering the compression will not increase the power. Just how thick the plate must be will have to be determined by experiment. It will not be necessary to remove the cylinder blocks from the crankcase, because the plates can be made in semi-circular form and slipped between the cylinders and the crankcase from each side. The first plate should be 1/8 in. thick. If it is found that this is not enough, then another plate 7 in. thick should be added. The happy medium will be found somewhere between these limits.

Fiat Engine Size

Q-Was Bordino's 300-hp. Flat traced against time at Ostend made Italy?

2—How many cylinders has the engine? What is the bore and stroke?

3-Does it have dual valves and dual ignition?

-When did this car race? How fast 4-When did it go?

-Is the Fiat the most powerful gasoline car made?

6-What is the price in this country?-Wendell M. Hunt, Whittier, Cal.

1-Fiat cars are made in Italy and the United States. A factory branch was maintained at Poughkeepsie, N. Y.

2-This engine has four-cylinders. The bore and scroke is 7.48 by 10.4 in.

3-The valves of this engine are of the overhead type, being driven from an overhead camshaft, the whole being inclosed by an aluminum housing. Just whether the camshaft operated dual valves is not known, neither is it known whether the ignition was single or double.

4-Dec. 16, 1913, Arthur Duray attained a speed of 142.9 m.p.h. This speed was efficiently timed, but was never recognized as a record because the attempt was not made in both directions, with and against the wind.

5-The present line of Fiat cars use an engine with bore stroke of 51/8 by 6 % in. This gives a piston displacement of 567 cu. in., which is larger than any of the motor cars listed.

6-The Fiat touring car, sells for \$7500, the limousine lists at \$8500 and the sedan is built to order.

Rings Probably Improperly Fitted

Q—Have run a tractor two years and used it for everything except planting corn and cultivating the same. I have no trouble with it except it uses 3 gal. of vylinder oil every 10 hr. and I think it too much. There is no leak. It gets past the rings, as the exhaust is of a light blue. I have put in new pistons and rings this spring, have drilled small holes in the bottom grooves in piston but of no avail. Can you suggest anything that may help? The tractor is a 1917 9-18 Case.—W. Hein, Ansley, Neb. Ansley, Neb.

The trouble with your tractor is that there was no attempt made to fit the rings to the pistons or to the cylinder

walls. This is happening very frequently lately and is being brought to our attention almost daily. Fitting new rings does not mean the rings must be slipped into the groove of the piston and the piston slipped into the cylinder. It means the ring must be fitted just as carefully to its piston groove and rubbing surface as a valve is fitted to its seat. This is explained in the answer given E. D. Brown, Newton, Mass., in this issue.

Rebuilding

Speed Suggestions for Chalmers

Q-Give suggestions for making a 35-A six-cylinder Chalmers into a racer.

2-What would be the advantage, from a standpoint of speed, if the engine is equipped with overhead valves and a Bosch high-tension magneto?

3—What changes would be necessary in the engine if overhead valves are attached, and what would be the approximate cost to effect the change?

Give outline of speed derived theo-4—Give outline of speed derived theo-retically, taking into consideration the size of wheels, gear ratio and revolutions per minute, if overhead valves were attached, together with any other information which you might deem advisable.—Cris. Carlos, you might Atlanta, Ga.

1-A race car design to fit this chassis is shown in Fig. 18.

2-From the standpoint of speed we do not believe a magneto will make any noticeable difference. Overhead valves, if the valve arrangement is right, will affect the speed quite materially. To make this change in the engine a new head will have to be made. This head must have bearing supports for the rocker arms and should be fitted with cages to hold the overhead valves. The cost of this change will vary considerably, according to the equipment to the shop undertaking the work. A pattern will have to be made for the head, and there will be considerable machine work in fitting new rocker arms. At any rate the cost will not be less than \$250.

3-See 2.

4-The gear ratio 3 to 1, using 32 by 4 tires, the speed of your car will be very close to 100 m.p.h. at 3000

Studebaker Speedster Design

Q-Illustrate method to shorten wheelbase on a 1917 Studebaker.

2—Show design of speedster windshield and top for two.—Tine Carr, Detroit.

1-The wheelbase of this car is only 112 in. Unless the car is to be used for racing purposes on a smooth track, there is very little necessity for shortening the wheelbase. The riding qualities of the car will be noticeably affected for the worst. The weight distribution on the tires also will be changed considerably, and if the position of the engine in the frame remains the same, steering will be interfered with considerably when making sharp turns.

If the wheelbase on your car were 125 in. or more, there would be a logical reason for shortening it, but since it is only 112 in. we can see no legitimate reasons for making it less. However, the change is not very hard to make. The frame channel can be cut near the center and a piece taken out equivalent to the amount of shortening desired. The frame then should be reinforced with a smaller channel fitted inside the frame channel. This can be riveted or welded or, preferably, both.

2-A speedster design is shown in Fig. 17. The dotted lines show the relative proportions of the original body.

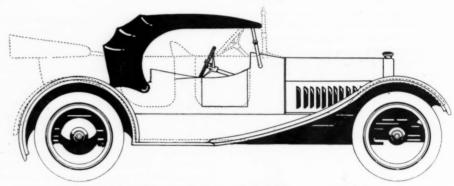


Fig. 17-Suggestion for changing 1917 Studebaker into speedster

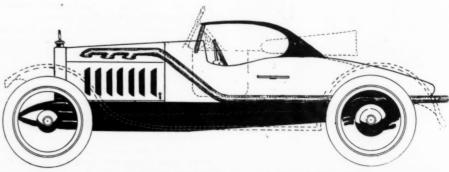


Fig 18-Suggestion for racing body on Chalmers chassis

Bell Trucks for Long and Short Haulage

Light Model for Iowa Farm—Heavier for Colorado

THE first Bell truck was produced April 1 this year and present production is limited to fifteen trucks a month with prospects of increased output to meet the demand. The company, the Iowa Motor Truck Co. of Ottumwa, Iowa. now has distributers in Denver, Omaha, Sioux City, St. Louis and Memphis and an export office in New York. The location at first thought might seem unusual but, as a matter of fact, the company does not go as far for its parts as many of the larger and better known eastern makers. The electric power of the dam in Des Moines river is economical, labor conditions are better than in the eastern manufacturing centers, which means smaller production costs, four railroads afford excellent tranportation facilities and, in short, the company finds full reason for existence west of the Mississippi.

Two models will be made, a 1½ and 2½-ton, with practically the same specifications, including a 4¼ by 5½ Buda four-cylinder engine, Eisemann ignition, Stromberg carbureter and Stewart vacuum feed. A Borg & Beck dry-plate multiple-disk clutch is used. Drive is through a tubular propeller shaft of high carbon cold-rolled steel, fitted with SKF bearings, and with three universal joints. A Russel rear axle with Bower bearings and Shuler front axle with Timken bearings are used.

Makes Own Frame

The company makes its own frame of 6-in. channel steel with 5-in. channel steel cross members, all corners reinforced and the frame hot-riveted throughout. The frame extends well out beyond the radiator, which is made by the Chicago Mfg Co., serving as a bumper also. The springs are 3 by 54 in. rear, twelve leaves, and 21/2 by 42 in front, ten leaves. Tires, 34 by 4 in front, and 34 by 6 in, rear are fitted. Pneumatics are extra. Regular equipment includes driver's seat, cab, windshield, cushions, storm curtains, taillamps, sidelamps. Klaxon horn, etc.

The company recently increased its capital to \$100,000. H. L. Bell, who sold cars out of Ottumwa for about eight years, is president. Iowa, Nebraska, Colorado and the Dakotas are buying trucks today, and the company believes it can dispose of every truck made by it in this territory as fast as they are built. The maximum haul on the Iowa farm is about 10 miles, and the 11/2-ton model is expected to meet this demand. In Colorado the maximum haul may be 50 miles, necessitating a truck of larger capacity, and for this field the 21/2-ton model is made. This is built to meet conditions where a truck must operate 75 per cent of the time perhaps on rough reads and the smaller portion of time on paved streets and is amply powered and of sturdy construction throughout,



One of the Bell trucks which come in two capacities

the company finding a ready market for the truck because it is built to meet these conditions.

CARS WITH HAND-MADE BODIES

New York, Aug. 22—The Collins Motors, Inc., has been organized to build special cars to compete with foreign-made cars sold in this country. A 120-in. chassis will carry a roadster body built for the clubman and amateur sportsman. A longer chassis will be fitted with touring, town and other special bodies. General offices and the factory will be at Huntington, L. I., while the metropolitan sales and export offices will be in New York.

The company is capitalized for \$400,000 and has the following officers: President, Albert H. Collins; vice-president. William B. Brewster; treasurer, Spencer C. Smith; and secretary, Charles H. Stoll.

ZONTA TIRE INCORPORATES

Sioux City, Iowa, Aug. 22—The Zonta Tire & Rubber Co. was incorporated here this week with a capital stock of \$1,500,000 and announced that a factory will be started Oct. 1 and that by April 1 the plant will produce tires and tubes. A tract of land 200 by 400 ft. has been bought on the Floyd river, adjoining the plant of the Hawkeye truck factory. The first unit in the factory buildings will be three stories, 100 by 150, of brick. A separate office building will be built. The incorporators are A. K. Kilborn, Hugh A. Ritchie, H. W. Caldwell and T. P. Scott.

TO MAKE BODIES FOR HANSON

Atlanta, Ga., Aug. 22—The Murry Auto & Parts Co. of Cincinnati have begun moving its plant to Atlanta. It will occupy the building, formerly the old Studebaker plant and will resume the production of bodies and sheet metal parts.

The capital stock of the reorganized company has been raised to \$100,000, the majority of which has been ab-

sorbed by the Hanson Motor Co., whose plant is situated nearby. The company now has about 50,000 sq. ft. of floor space and equipment sufficient to build the bodies and fenders for the Hanson six and have plans under way whereby they will more than double the present capacity.

The company will provide immediate employment for 150 skilled workers, and this number will be increased as their plant is enlarged in keeping with the present policy of the Hanson company to own or control the companies making all but a few of the standard units of their car.

TO MAKE OGREN IN QUANTITIES

Milwaukee, Wis., Aug. 22—The Ogren car, which has been built in limited quantities at Chicago for some time by Hugh W. Ogren, formerly racing driver, will be manufactured on a quantity scale in Milwaukee. Mr. Ogren has completed the organization of the Ogren Motor Car Co., a Wisconsin corporation with an authorized capital of \$500,000. The former Elite roller rink and auditorium has been acquired and is now being equipped as a machine shop and assembling floor. It is stated that 95 per cent of the parts for the Ogren will be provided by makers in a radius of 35 miles of Milwaukee.

U. S. RUBBER TO EXPAND

New York, Aug. 22—The new issue of \$36,000,000 of common stock for the United States Rubber Co. has been underwritten and will be used for four purposes:

To pay off all current indebtedness that can be paid.

For new construction planned and in progress, designed principally for the increase of the production of tires.

For the extension of rubber plantations in the East.

For facilitating the carrying of stock under profit sharing for the benefit of the company's employees.

Motor Age Monthly Guide to Tractors

2 3 A 4 5 6 7 A 8 9 10 A 11 12 13 14 15 16 17 18 19 A	Adams Co., Maryville, Ohio	Adams	9		No. plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of	Cylinders
3 A 4 5 6 7 A 8 9 7 10 A 11 12 13 14 15 16 17 18 19 A	Advance-Rumely Thresher Co., Laporte, Ind		- 1	13	1-2		0150	5500	850	2 Wh.	36 51	Herc. Own	1 Hor. 2 Hor.
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 14			12 16	20 30	3 4	22 x 36 28 x 44	2150 2850			2 Wh.		Own	2 Hor.
8 9 10 11 12 13 14 15 16 17 18 19 14		Oil Pull	20	40	5-6	32 x 52	3750			2 Wh.	64	Own	2 Hor.
8 9 10 11 12 13 14 15 16 17 18 19 14		Oil Pull	30	60	8-10	36 x 60	5900	5300	1 005	2 Wh.	80 50	Own Own	2 Hor. 4 Ver.
8 9 10 11 12 13 14 15 16 17 18 19 14	Allis-Chalmers Mfg. Co., Milwaukee, Wis	Allis-Chalmers	18 10	30 18	3-4 2-3		3000 1650	4800	1,985 950	2 Wh. 2 Wh.	56	Own	2 Opp.
10		Allis-Chalmers	6	12	1		1000	2300	795	2 Wh.	48	Le Roi	4 Ver.
11 12 13 14 15 16 17 18 19	Andrews Tractor Co., Minneapolis, Minn	Andrews	12	20			1900	5250 4900	1,000	2 Wh.	48 54	Veer. Buda	4 Opp. 4 Ver.
12	Appleton Míg. Co., Batavia, Ill	Aultman-Taylor		20 30	3-4	23 x 36	2000 3300	7800	1,650	2 Wh.	70	Wauk.	4 Ver.
14 15 16 17 18 19	Aultman-Taylor Machinery Co., Mansfield, Ohio	Aultman-Taylor	22	45	4-6	32 x 50	4700	12800		2 Wh.	70	Own	4 Hor.
15 16 17 18 19		Aultman-Taylor		60	8-12	36 x 50	8000	23000		2 Wh.	90	Own Le Roi	4 Hor.
16 1 17 18 19		Multipedal		10 20			750 2000	950 3500		2W or2C 2 Cr.		Buff.	4 Ver.
18 19	F. C. Austin Co., Inc., Chicago,	Multipedal		30			2400	4500		2W or 2C		Buff.	4 Ver.
19		Multipedal		40	4		3200	10250		2 Cr.		Auto.	4 Ver.
	Automotive Corp., Toledo, Ohio	Multipedal	25 12	50 24	2	30	4200 1500	12500 3200	1,450	2 Cr.	42	Buff. Herc.	4 Ver.
20	Automotive Corp., Toledo, Onio	Avery	5	10	2	Small	1300	2600	1,200	2 Wh.	38	Own	4 Ver.
21		Avery	8	16	2-3	20 x 30		4900		2 Wh.	50	Own	2 Hor.
22	Avery Co., Peoria, Ill.	Avery	1	25	3-4	24 x 36		7500		2 Wh.	56 60	Own Own	2 Hor.
23 24	Avery Co., Peoris, III	Avery		28 36	3-4 4-5	24 x 36 28 x 46		6800 9250		2 Wh.	65	Own	4 Hor.
25		Avery		50	5-6	32 x 54		12500		2 Wh.	69	Own	4 Hor.
26	D. L. Martin Co. Tanalan Mila	Avery	1	80	8-10	36 x 60		22000		2 Wh.	871	Own	4 Hor.
	Bates Tractor Co., Lansing, Mich	Bates Ali Steel		25 10	3 2	24	3000 1125	4000 3200	1,340	W.&C.	50	Own Le Roi	4 Ver.
	Beltrail Tractor Co., St. Paul, Minn	Beltrail		20	2-3		2000	4500	1,010	1 Cr.		Wauk.	4 Ver.
30		Best Tracklayer	12	25		22 x 36	2100	5200	2,450	2 Cr.		Own	4 Ver.
	C. L. Best Gas Tractor Co., San Leandro, Cal	Best Tracklayer		40		32 x 54		11000	4,100	2 Cr.		Own	4 Ver.
32 33 1	Bethlehem Motors Corp., Allentown, Pa	Best Tracklayer		75 36	4	42 x 70 28 x 46	3100	28000 6200	5,850	2 Cr. 2 Wh.	54	Beav.	4 Ver.
	Blumberg Mfg. Co., San Antonio, Tex	Blumberg Steady Pull		24				3400	1,485	2 Wh.	40	Own	4 Ver.
	Boring Tractor Corp., Rockford, Ill	Boring		20				3550	1,485	2 Wh.	54	Wauk.	4 Ver.
	Buckeye Mfg. Co., Anderson, Ind	Trundaar		35	1 -		4000	9200 21000	5,500	2 Cr. 2 Cr.		Wauk.	4 Ver.
38	Davidy Tillian Division Con Tilliany, Cally	Buckeye 60		45			1	25000	6,500	2 Cr.		Auto.	4 Ver.
39		Creeping Grip		30	1			7000	2,250	2 Cr.		Wauk.	4 Ver.
40	Bullock Tractor Co., Chicago,	Senior		50 75			6000 7500	18000 20000	4,500 5,000	2 Cr. 2 Cr.		Wauk.	4 Ver. 4 Ver.
42		Case				20 x 28		3400	1,200	2 Wh.	42	Own	4 Ver.
	J. I. Case T. M. Co., Racine, Wis	Case		20	1	20 x 36		5050	1,325	2 Wh.	52	Own	4 Ver.
44 45		Case		27 40	3-4	26 x 46 32 x 54		5600 14050	1,600 3,000	2 Wh.	52	Own	4 Ver. 2 Opp.
	Champion Tractor Co., Argo, Ili	Champion			1	24	2750	3100	1,465		48	Buda	4 Ver.
	Chase Tractor Co., Syracuse, N. Y	Chase		18				4700		2 Wh.	48	Buda	4 Ver.
	Cleveland Tractor Co., Cleveland, Ohio					24	1500 2500	6500	1,585	2 Cr. 2 Wh.	70	Weid. Own	4 Ver. 2 Hor.
	Coleman Tractor Co., Kansas City, Mo	Coleman				24	3000	5100	1,395	2 Wh.	44	Clim.	4 Ver.
51	Craig Tractor Co., Cleveland, Ohio	Craig	15	25	1	28 x 46	3000	5750			44	Beav.	4 Ver.
	Dart Truck & Tractor Corp., Waterloo, Iowa	Blue J		25	1	24	2500	4300	1,750	2 Wh.	42	Buda	4 Ver.
53	Dauch Mfg. Co., Sandusky, Ohio			30 20		26 24	3000 2000	4500 4080	1,950 1,500	2 Wh.	42	Buda Own	4 Ver. 4 Ver.
55		Sandusky E				32	3000	8000	2,500	2 Wh.	56	Own	4 Ver.
	Dayton-Dowd Co., Quincy, Ill	Leader B	1			18 x 28		4800	1,000	2 Wh.	48	Own	2 Opp.
57 58		Leader C				32	4000	6600 12000	2,250 3,000		53	. Twin Own	4 Ver. 2 Opp.
	C. H. A. Dissinger & Bro. Co., Wrightsville, Pa	Capital 30.			1			14000	4,000	2 Wh.	60	Own	2 Opp.
60		Capital 45						16000	4,400		66	Own	2 Opp.
61	Eagle Mfg. Co., Appleton, Wis	Eagle F				26 32	2400 3300	7050	1,400		48 52	Own	2 Hor. 2 Hor.
	Electric Wheel Co., Quincy, Ill	Allwork				28	3000	5000	1,575		48	Own	4 Ver.
64		E-B 12-20 AA	. 12			24	2500	4355		2 Wh.	54	Own	4 Ver.
65	E Protingles Co. Problem III	E-B 9-16				18	1500	4260		2 Wh.	54	Own	4 Ver.
67	Emerson-Brantingham Co., Rockford, Ill	E-B 12-20 E-B 20-35		20 35		24 28	2000 3300	6155 10000		2 Wh.	60 72	Own Own	4 Ver.
68		(E-B 40-65	. 40	65		44	10000	23500		2 Wh.	90	Own	4 Ver.
	Evans Mig. Co., Hudson, Ohio	Evans K	. 20	35	4	32	3500	5500	1,985	2 Wh.	60	Buda	4 Ver.
	Fageol Motors Co., Oakland, Cal	Farm Horse		18		98	. 1250	3000 4950	1,295	1	48	Over. Clim.	4 Ver. 4 Ver.
79		Farm Horse		25		28 27	2500	6000	1,485	2 Wh.	54	Buda	4 Ver.
73	A. B. Farquhar Co., Ltd., York, Pa	Farquhar	. 18	35	4-5	30	3600	16000		2 Wh.	84	Own	4 Ver.
	A. B. Farquhar Co., Ltd., York, Pa	Farquhar				53	5000	19000		2 Wh.	84	Own	4 Ver.
	Henry Ford & Son, Inc., Dearborn, Mich	Fordson				28-32	. 1800 3200	2700 6000	\$2,500	2 Wh.	42 42-36	Own Clim.	4 Ver.
	Frick Co., Waynesboro, Pa	Frick		25	_	27	3000	5800	\$2,300	2 Wh.	60	Erd	4 Ver.
	Fulton Tractor Co., Anderson, Ind	Fulton		20	2			2500	1,275		56	Wauk.	4 Ver.

Abbreviations: Traction—Wh., wheel; Cr., crawler. Engine—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturer horizontal; Opp., opposed. Fuel—G., gasoline; K., kerosene; D., distillate. Carbureter—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web-Holl., Holley. Magneto—A.K., Atwater Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. Clutch—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; jaw clutch. Final drive—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. Drive—Op., open; In., inclosed.

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and Their Technical Specifications These tables are revised and brought up to date monthly

Line No.	Bore and stroke	Normal R. P. M.	Fuel	Make and size of carbureter	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Gearset type	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range, M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel
1 2	6 x 8	375 560	G-K K-D	21/4-Own	Donal.	Web. Bosch	Own Own		Ch. Sel. G.	14-18 19	950 560	2790	1 2	2.1-3.26	21/4 2.1	Ch. B. G.	Op.	No
3	7 x 8½	530	K-D	21/2-Own	Donal.	Bosch	Own	Own	Sel. G.	23	530	3190	2	2.1-3	2.1	B. G.	Op.	No
5	8 x10 10 x12	450 375	K-D K-D	2¾-Own 3¼-Own	Donal.	Bosch Bosch	Own Own	Own	Sel. G.	26 36	450 375	3060 3540	2	2-3.2	1.9	B. G. B. G.	Op.	No No
6	43/4× 63/2	830	G-K		Ben.	K-W		Own	Sel.	15	830	2600	2	2.3-2.8	2.3	S. G.	In.	Yes
7 8	514x 7 318x 41/2	720 1000	G-K G	11/2-King.	Ben. Ben.	K-W Dixie		Own Own	Sel. G.	141/2	720 1000	2600 2600	1	2.3 11/2-2.8	2.3	S. G. S. G.	Op.	Yes Yes
9	4 x 5 41/4 x 51/2	1000 1000	G G-K	11/4-Krice 11/4-Scheb.	Ben.	Bosch Bosch	Own B. & B.		Fr. Sl. G.	12 12	800 825	2500 2600	3 2	214-314	21/4	Ch. G.	Op.	Yes Yes
11	434x 634	900	G-K	13/8-King.	Ben.	Eise.	Own	Own '	S. G.	20	450	2250	1	2.25	21/4	S. G.	Op.	Yes
12 13	5½x 8 7 x 9	600 500	G-K G-K	2 -King. 21/2-King.		Eise. Eise.			S. G. S. G.	20 24	600 500	3100 3100	2	2.13-2.93 2.2	2.93	8. G. 8. G.	Op.	No No
14	27/8x 41/8	1000	G-K	27g-King.	Orem	K-W	Own			6	1440	2600	1	23/2			Ор.	Yes
15 16	4 x 5 414x 6	1000 900	G-K G-K		Orem Orem	K-W K-W	Own Own			916	1300 965	2600 2600	2 2	2 1-3 1				No No
17	5 x 7	800	G-K	11/2-Ben.	Orem	K-W	Own	Own	Sel. G.	20	500	2600	2	17/8-3	2	G.	Op.	No
18	6 x 71/2 33/4x 51/8	750 1000	G-K	11/4-King.	Orem	K-W Eise.	Own B. & B.	Own	Sel. G.	20 10	500 1000	2600	2 2	11/8-3 25/8-51/4	25/8	G.	In.	No Yes
20	3 x 4	1200	G-K	3/4-King.	None	K-W	Own	Own	Sl. G.	12	780	2450	3	1 1 -4 2 3	21-3	S. G.	Op.	No
21 22	5½x 6 6½x 7	600 570	G-K-D G-K-D	11/4-King, 11/2-King.	None None	K-W K-W	Own Own	Own Own	SI. G. SI. G.	1916	600 570	2830 2900	2 2	1¾-3 1¾-2¾	134	8. G. 8. G.	Op.	No No
23	45/8x 7	650	G-K-D	11/4-King	None	K-W	Own	Own	Sl. G.	16	650	2750	2	134-234	134	S. G.	Op.	No
24 25	5½x 6 6½x 7	650 500	G-K-D G-K-D	1½-King. 2 -King.	None	K-W K-W	Own Own	Own Own	SI. G. SI. G.	18 22	650 500	3000 2880	2 2	2-3 2-3	2 2	S. G. S. G.	Op.	No No
26	73/4x 8	500	G-K-D	2 -King.	None	K-W	Own	Own	SI. G.	26	500	3400	2	13/4-2 \$	2	S. G.	Op.	No
27 28	45/8x 51/2 31/8x 41/2	800 1200	K D	1½-Own 1 -Mayer	Own Donal.	Dixie Bosch	Own Own	Own Own	Sl. G. S. G.	10 12	800 600	1900	3 2	11/4-6	21/2	S.G. G.	In.	No
29	33/4x 51/4	1000	G-D	1 -King.	Ben.	Dixie	Own		Sl. G.	10	1000	2500	2	21/2-31/2	23/2	S. G.	Op.	Yes
30 31	45%x 51/4 61/4x 61/4	700 600	G-D D	1½-Ens. 1½-Ens.	Ben. Ben.	Dixie Dixie	Own	Own Own	Sl. G.	10	700	1750	2 3	2-3	3 234	G.	In. In.	No
32	734x 9	435	D	2 -Ens.	Ben.	Dixie	Own	Own	SI. G.				3		23/8	G.	In.	
33 34	4¾x 6 4 x 5	900 750	K G	Strom. 11/4-Strom.	Ben. Orem	Bosch Boseh		Foote	Sl. G. Sl. G.	10	1278 600	1800	2 2	1.8-3.3 1-4	3	8. G. G.	In. In.	Yes
35	41/4x 53/4	1000	G-K	114-	Ben.	King.			Sl. G.	10	435	1140	2	1-5		Ch.	Op.	Yes
36 37	4¾x 6¾ 6½x 8	950 500	G-K-D G-K	1½-Deppe 1½-Ben.	Ben.	Bosch K-W	Own	Own Own	S. G. G.	10 14	950 250	2650 1000	2 4	3.1-8 3.1-8	234	S. G. Ch.	In. Op.	
38	7½x 9	500	G-K	2 -Ben.	Ben.	K-W	Own	Own	G.	14	222	870	1	21/2		Ch.	Op.	
39 40	43/4x 63/4 51/2x 71/2	900 850	G-K G-K	1¼-Ben.	Ben. Ben.	Dixie Dixie	Own B. & B.	Own Own	Sl. G. Sl. G.	12 15	600	1875 2250	1 3	134-314	21/2	D. R.		No No
41	714x 9 1		G-K		Ben.	Dixie	B. & B.	Own	Sl. G.	14	60	220	2	214-31/2				No
42 43	37/8x 5 41/4x 6	1050 900	K	11/8-King. 11/4-King.	Own Own	King.	Own	Own Own	Sl. G. Sl. G.	141/4	1050 900	3900 4000	2	21/4-31/4	21/4	S. G. S. G.	In. Op.	No No
44	4½x 6	900	K	King.	Own	King.	Own	Own	SI. G.	16	900	3762	2	2-31/6	21/4-31/2	S. G.	Op.	No
45 46	834x 9 414x 514	475 1000	G-K	2½-King. 1¼ Case		K-W Dixie	Own	Own Fuller	SI. G. SI. G.	24 12	475 850	2980 2600	3	2-3 114-414	236	S. G.	Op.	No
47	334x 51/2	900	G	1¼-Holl.		King.	Bier.	Own	Sl. G.	8	900	1885	2	11/4-21/4	13/6	G.	Op.	No
48 49	334x 51/2 61/2x 7	1200 550	G-K-D K	11/8-King. 11/2-King.	Own	Eise K-W	B. & B.	Own	S. G. S. G.	8 18	1200 530	2500 2500	3	11/4-31/4	31/2	G. S. G.	In. In.	No Yes
50	5 x 61/2	800	G-K	11/4-Strom	Ben.	Dixie	B. & B			. 12	800	2100	2	11/4-4	3	Worm	In.	Yes
51 52	43/4x 6 41/2x 6	950 1050	K G	11/2-Strom. 11/4-King.	Ben. Ben.	Berl. Dixie	Detlaff	Covert	S. G. Sel. G.	12	830 750	2610 2350	3	2,4-3.86	2-4	S. G. D. R.	In. In.	Yes Yes
53	41/4x 51/2	1050	G	11/4-King.	Ben.	Dixie	Detlaff	Cotta	Sel. G.	1	750	2355	3	114-5	23/2	D. K.	In.	No
54 55	41/4x 51/4 5 x 61/2	985 750	G-K G-K	1¼-King. 2 -King	Ben. Ben.	Dixie Dixie	Own	Own Own	Sel. G.		97 5 750	2577 2945	3 2	2-5 214-314	2-3	S. G. S. G.	Op. Op.	Yes No
56	61/4× 6	750	K	11/2-King.	Own	King.	Own	Own	Sel. G.	14	750	2750	2	1.8-21/4	1.8	G.	Op.	Yes
57 58	5 x 71/3 81/2x12	700 300	K	134-King.	Ben.	K-W	Own	Own	Sel. G.		700 300	2600	3	1.8-2	1.8	Ch.	Op.	No
59	9 x14	300								. 36	300							
60 61	10½x15 7 x 8	250 425	K	1½-Linga.		. Dixie	Own	Own	SI. G.	40	250 450	2250	2	2-3	2	G.	In.	Yes
62	8 x 8	425	K	2 -Linga.		. Dixie	Own	Own	Sl. G.	24	450	2678	2	2-3	2	G.	In.	Yes
63 64	5 x 6 434x 5	800 900	K	1½-King.	Ben. Ben.	King. K-W	Own Own	Own	Sl. G.	12	800 900	2514 2800	2 2	134-21/2	21/2	S. G. G.	In.	Yes No
65	41/8x 41/2	800	K	11/4-Ben.	Ben.	K-W	Own		. Sl. G.	12	800	2500	2	1.72-2.33		. G.	ln.	No
66 67	43/4x 5 5 x 7	850 700	K	1½-Ben. 1½-Ben.	Ben. Ben.	K-W K-W	Own		Sl. G.	163/4	708 600	2225 2500	2 2	1.71-2.25 1.71-2.26		G. G.	In. In.	Yes
68	71/4x 9	500	K	21/2-Ben.	Ben.	K-W	Own		. SI. G.	22	500	2880	1	2	2	G.	In.	No
69 70	4½x 6 33%x 5	1000 1100	G-K	1½-Ray. Till.	Holl. Own	Dixie Berl.	B. & B Own	Own Own	Sel. G.	24	415	2600	1	234-434	230	G. G.	In. Op.	Yes Yes
71	5 x 61/2	800	D	11/5-King.	Ben.	Dixie	Bier.	Own	SI G.	14	800		. 2	1-4	3	Ch.	In.	No
72 73	6 x 8	900 550	G-K G-K	1½-King. 2 -King.	Ben.	K-W K-W	Own	Nutt.	Sel. G.		800 275	2000 2300	2 2	1-4 1-2.3		. G.	In. Op.	
74	7 x 8	550	G-K	2 -King.		. K-W	Own			. 32	275	2300	2	1-2.3		. G.	Op.	
75 76	4 x 5	1000 800	K G-K	Holl. 1-1/2King.	Own Ben.	Own Dixie	Own B. & B	Own Cotta	S. G. Sl. G.	91/2	1000 750	2500 2730	3	1-15	23/2	Worm		Yes Yes
77	4 x 6	900	K	11/4 - King.	Ben.	King.	Own	Nutt.	SI. G.	13	900	3075	2	2.3-3.8	2.3	G.	Op.	Yes
78	334x 51/2	1150	G-K	1-King.	Own	King.			Fr.	10-12				. 1-15	21/2-3	Ch	Op.	Yes

Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. Cylinders—Ver., vertical; Hor., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Cr., Carter; Perr., Perrin-Ingram. Air Cleaner—Donal., Donaldson; Ben., Bennett; pec., special. Gearset—B. & S., Brown & Sharpe; Nutt., Nuttall. Gearset type—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding

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	Tractor	Drawbar	Belt	No plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of Engine	Cylinders
	(G-O F		22 28	2 3	26 28	2250 2650	4300 4200	1,375 1,485	2 Wh. 2 Wh.	46 46	Wauk. Wauk.	4 Ver. 4 Ver.
	Hart-Parr 30		30	3	25	3000	5158	1,395	2 Wh.	52	Own	2 Hor.
	Wheat	. 12	24			3000	4250	1,695	2 Wh.	48	Erd	4 Ver.
	Caterpillar		45 75			5000 9300	13600 25000		2 Cr. 2 Cr.		Own Own	4 Ver. 4 Ver.
			25	3	22	2000	5000	1,285	2 Wh.	60	Wauk.	4 Ver.
	C	18	30	4	28		5000	2,375	2 Wh.		Clim.	4 Ver.
	1		70 10	1		7500 900	20800	4,500 900	2 Wh.	96 50	Own Le Roi	4 Opp. 4 Ver.
• • • • . • • • • • • •	Indiana		16	2		900	3800	900	2 Wh.	40	Own	4 Ver.
	Titan	10	20	3	24	1800	5700	1,000	2 Wh.	54	Own	2 Hor.
	Mogul		20	3	24 28	1800 2350	5500 9000		2 Wh.	54 66	Own	1 Hor. 4 Ver.
			30 20	3	28	2300	4300		2 Wh.		Erd	4 Ver.
	J. T. N		20	3-4	28	3200	6500	2,800	2 Cr.		Ch ⁱ ef	4-Ver.
			20	2	20	1500	3000	1,250	1 Wh.	48	Wauk.	4 Ver.
	Keck-Gonnerman Flour City Jr.		24 24	3	24		6500 6800	1,500	2 Wh.	60	Own	2 Hor. 4 Ver.
n			35	4-6			10000		2 Wh.	72	Own	4 Ver.
	Flour City	. 30	50	6-8			14000		2 Wh.	84	Own	4 Ver.
	Flour City		70	8-10			21000		2 Wh.	96	Own	4 Ver.
• • • • • • • • • • • • • • • • • • • •			24	3	24	2000	3800	1,150	2 Wh.	56	Own Own	2 Hor. 2 Hor
	La Crosse G		24 30	3	24	2000 3000	4000 4500	1,250 1,485	2 Wh.	50	Clim.	4 Ver.
			25	3-4	28		v000	1,985	2 Wh.	54	Beav.	4 Ver
			25	3	20-22	2400	5500	1,800	2 Wh.	60	Wauk.	4 Ver.
			30	3	28	4000	5000	2,100	4 Wh.	50	Buda	4 Ver.
rk			36	4	28	1900	5775	2,250	2 Cr. 4 Wh.	48	Own	6 Ver. 4 Ver.
			22	3-4	26		5200 .	1,650	2 Wh.	54	Own	4 Opp.
	Little Giant A		35	5-6	32		8700	2,500	2 Wh.	66	Own	4 Opp.
	1		26	3	24	2800	5100 4200	1,750	2 Wh.	66 50	Wauk. Own	4 Ver. 4 Ver.
	Twin City 12		30	3 4	20 24	2000 3000	7800		2 Wh.	54	Own	4 Ver.
olis, Minn				6	32	4700	16000		2 Wh.	76	Own	4 Ver.
	Twin City 40			8-19	36	7500	23700		2 Wh.	84	Own	4 Ver.
	Twin City 60		90	12-15		11250	28000 3300	1,500	2 Wh.	84	Own Own	6 Ver. 4 Ver.
***********	Moline Universal D		18	1-2		1400	3700	1,580	2 Cr.		Kerm.	4 Ver.
				3	24	2200	6200	2,050	2 Cr.		Erd	4 Opp.
	Monarch		30	4	28	3300	7400	2,550	2 Cr.		Beav.	4 Ver.
•••••	Nilson Junior		25 36	3-4 4-5	24 30	3000 4000	5000 6400	1,775 2,475	2 Wh.	50 52	Wauk. Wauk.	4 Ver. 4 Ver.
			18	2	20	1600	3000	1,175	2 Wh.	48	Gile	2 Opp.
				3	24	2600	5225		2 Wh.	60	Buda	4 Ver.
	Parrett H			3	24	2600	52 25		2 Wh.	60	Buda	4 Ver.
				3	24	3000	5100 6100	1,985	2 Wh.	56	Clim. Own	4 Ver. 4 Opp.
•••••	C		60	10	36		23500		2 Wh.	96	Own	4 Opp.
	· Plow Man	. 15	30	3-4	30	4000	4800		2 Wh.	60	Buda	4 Ver.
ron, Mich			25	3	22	2200	5700	1,600	2 Wh.	56	Erd G. B. S.	4 Ver.
			20 30	3	32 24-28	1500 2500	3500 4250	1,25 0 1,485	2 Wh.	32 60	Own	1 Hor.
			16	2	18	1500	4000	1,070	2 Wh.	54	Wauk.	4 Ver.
	Heider C			3	24	2000	6000	1,395	2 Wh.	57	Wauk.	4 Ver.
	Royer		1	2	18	2200	4600 6200	1,225	2 Wh.	54	Erd Wauk.	4 Ver. 4 Ver.
			1	3	24	3000	6900		2 Wh.	53	Wauk.	4 Ver.
	Russell Big Boss	20	40	4	30	4000	7600		2 Wh.	60	Model	4 Ver.
alia Bri	Russell Giant		1	8	40	8000	24000	1.770	2 Wh.	84	Own	4 Ver.
oolis, Minn			18	2 2	22 20	1900	3200	1,750	2 Wh. 2 Wh.	44	Buda Wauk.	4 Ver.
				3	20	5000			2 Wh.	51	Erd	4 Ver.
	Square Turn					. 3200	7800	1,875	2 Wh.	61	Clim.	4 Ver.
			1	4-5	36	3500	7000	1.000	2 Wh.	60	Own	4 Ver.
				4-6	28 30	3000 4500	7100 6500	1,800 3,000		60 42	Beav. Wauk.	4 Ver.
				1	24	2300	4000	1,395	2 Wh.	54	Wauk.	4 Ver.
	Turner-Simplicity	14	25	3-4	28	2600	4400	1,675	2 Wh.	54	Buda	4 Ver.
• • • • • • • • • • • • • • • • • • • •	1						3900	975		60	Gile	2 Opp. 4 Ver.
	U. S. C				24	2000	4100 3250	1,459	2 Wh.	60 48	Erd Own	4 Ver.
a					24	2000	6000		2 Wh.	52	Own	2 Hor.
	Mid-West	9	18	2-3		. 1500	3500	1,170	2 Wh.	56	Gile	2 Opp.
9			1			. 3000	5500	2500	2 Wh.	48	Beav.	4 Ver.
• • • • • • • • • • • • • • • • • • •					28 28	3500 4000	5240 8500	2,250 3,200		52 26-27	Clim. Stearns	
••••••						5000	6750			20-24	Wauk.	4 Ver.
	Yuba Ball Tread	20	35			. 5000	10250		2 Cr.		. Wis.	4 Ver.
		Yuba Ball Tread	Yuba Ball Tread 12 Yuba Ball Tread 20		Yuba Ball Tread 12 20 Yuba Ball Tread 20 35	Yuba Ball Tread	Yuba Ball Tread. 12 20 5000 Yuba Ball Tread. 20 35 5000	Yuba Ball Tread. 12 20 5000 6750 Yuba Ball Tread. 20 35 5000 10250		\begin{cases} \text{Yuba Ball Tread.} & 12 & 20 & \\ \text{Yuba Ball Tread.} & 20 & 35 & \\ \text{5000} & 10250 & 4,400 & 2 \text{ Cr.} \end{cases} \]		{ Yuba Ball Tread

Abbreviations: Traction—Wh., wheel; Cr., crawler. Engine—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Auto. Opp., opposed. Tuel—G., gasoline; K., kerosene; D., distillate. Carbureter—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Zeph., Zephyr; Enk. Atwater Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling. Clutch—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. Gearset—B. & spur gear; G., gear; Ch., chain; R. P., roller pinion. Drive—Op., open; In., inclosed.

er. ler. ler.

Ver. Ver. Ver.

Opp. Ver. Ver. Hor. Opp.

Ver. Ver. Ver. Ver. Ver.

Their Technical Specifications—Concluded

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Line No.	Bore and stroke	Normal R. P. M.	Fuel	Make and size of carbureter	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Gearset type	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range, M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
80	4¼x 5¾	1000	G-K	1¼-King.	Ben.	Eise.	Own	Own	Fr.	10	1000	2618	6	2-31/2	2-21/2	S. G.	In.	Yes	80
81	4½x 5¾ 6½x 7	900 750	G-K K	11/4-King. 11/2-Scheb.	Ben.	Eise. K-W	Own Own	Own Own	Fr. Sl. G.	10	1000 750	2618 2750	6 2	2-3½ 1¾-3.8	2-21/2	S. G. G.	In. Op.	Yes Yes	81 82
82 83	4 x 6	1000	G-K	King.	R-W	Berl.	B. & B.		Sl. G.	13		2600	2	21/2-4	21/2	G.	Op.	Yes	83
84	6 x 7	600 550	G-D G-D	1½-King. 2-King.	Donal.	K-W K-W	Own Own	Own Own	Sl. J. C. Sl. J. C.	14 16	625 467	2290 2649	2 2	2½-3½ 2½-3	2½8 2½8	G. Ch.	In. In.	No No	84 85
85 86	7½x 8 4¼x 5¾	900	G-K	11/4-King.	Own	King.	Own	Own	S. G.	13	900	3063	2	21/2-4	2 1	G.	Op.	Yes	86
87	5 x 61/2	400 400	K	1½-Strom.	Ben.	Dixie Dixie	Cotta Own	Foote	S. G.	14 30	600 400	2250 3200	2 2	1½-3½ 1½-2¼	2½ 2½-2½	G.	Ор.	No No	87 88
88 89	7½x 9 3½x 4½	950	G-K G	2 -King.	Ben. Ben.	A-K	Own	Own	S. G. Sl. G.	71/2	1200	1880	4	11/4-4	21/2	Ch.	Op.	Yes	89
90	4 x 5	1000	K	-Ens.	Own	Dixie	Own	Own	Sl. G.	121/4	635	2060	3	13/4-4		Ch.	In.		90
91 92	6½x 8 8½x12	500 400	K-D K-D	Own Own	Own Own	K-W K-W	Own Own	Own Own	S. G. S. G.	20 20	500 400	2600 2060	2 2	1.8-2.5 1.8-2.5	2.5 1.8-2.5	Ch.	Op.	No No	91 92
93	51/4x 8	575	K-D	Own	Own	K-W	Own	Own	S. G.	18	575	2800	2	1 8-2.4	2.4	Ch.	In.	No	93
94 95	4 x 6 43/x 6	900	G-K K	1½-Ben. 1½-Own	Ben. Ben.	Eise. K-W	В. & В.	Covert	Sl. G. Sl. G.	12 10	725 1000	2300 2600	3	21/4-4 11/4-5	23/8	G. G.	In.	Yes	94 95
96	33/4x 51/4	950	G-K	1-Ben.	Ben.	Dixie	Own	Own	S. G.	10	950	2500	2	25/8-6	23/4	G.	In.	Yes	96
97	6½x 8	800	K	1½-Scheb. 1½-Scheb.	Ben.	K-W A-K	Own	Own	Sl. G.	16 24	650 320	2700	2 2	2-4½ 2.2-3.25	21/2	G. G.	In.	Yes	97
98 99	5 x 5 51/4 x 6	800	K	1½-Scheb.		A-K		Own		28	350		1	21/4		G.			99
100	61/4× 7	600	K	2 -Scheb.		K-W		Own		32	275		1	21/4		G.			100
101 102	7½x 8 6 x 7	450 750	K	2 -Scheb. 1½-King.	Ben.	A-K	Own	Own Own	Sl. G.	34 11	275 750	2100	1	21/4 21/2	21/2	G. G.	Ор.	Yes	101
102	6 x 7	750	K	11/2 King	Ben.		Own	Own	Sl. G.	11	750	2100	1	21/2	21/2	G.	Op.	Yes	103
104	5 x 6½	650 950	G-K G-K	1¼-Ray. 1¾-King	Ben. Own	Dixie Dixie	Own	Own Nutt.	Sel. G.	14 18	800 475	2600 2200	2 2	2½-5 1½-3	236	Ch. G.	In. In.	Yes Yes	104
105 106	4½x 6 4¼x 5¾	900	K	11/4 - King.	Own	Eise.	Bier.		Sel. G.	12	900	2200	2	21/2-4	23/2	G.		Yes	106
107	41/x 6	1000	G-K	1½-Zen.	Own	Dixie	Own	Own	Sel. G.	16	597	2500	2	11/2-4	2.7	G. Worm	In.	No	107
108	53/x 7 5 x 114	800	G K	2½-Any Strom.	Ben.	Dixie Dixie	Spec. Own	Spec. Own	Sel. G.	12	900	2600	3 2	21/2-41/2	2-4	G.	In. In.	Yes	108
110	41/4x 6	900	K	11/4-King.	Own	K-W	Own	Own	Sl. G.	9	900	2100	3	11/2-6	3	G.	In.	No	110
111 112	514x 64 414x 534	750 1000	K G-K	1½-King. 1¼-King.	Own Own	K-W Dixie	Own Own	Own	Sl. G. Sl. J. C.	13 12	750 800	2500 2512	3 2	1½-6 2-3	3 2.5	G. S. G.	In. Op.	No No	111
113	41/4× 6 3	1000	G-K	11/4-H-S	Ben.	Bosch	B. & B.	Own	SI. G.	16	650	2700	2	2.2-2.9	2.2-2.	S.G.	In.	Yes	113
114	5 x 7½ 6¼x 8	650 600	G-K G-K	13/4-King. 2 -King.	Ben.	K-W K-W	Own	Own	SI. G. SI. G.	17 20	528 600	2400 3150	2 2	2-23/4 1.4-2	2-23/4	S. G. S. G.	ln. Op.	No No	114 115
115 116	71/4x 9	535	G-K	21/2-King.		K-W	Own	Own		23	535	3200	1	2	2	S. G.	Op.	No	116
117	71/4 x 9	535	G-K	3 -King.	l	K-W	Own	Own		23	535	3200	1	2	2	S. G.	Op.	No	117
118 119	3½x 5 3¾x 4	1800	G G-K	1¼-Holl. 1 -King.	Ben. Ben.	Remy K-W	B. & B. Bier.	Own	Sl. G. Sel. G.	9	1200 750	3200	1 1	31/2	3-31/2	S. G. Ch.	In. Op.	Yes No	118
120	4 x 6	800	G-K	11/4-King.	Ben.	K-W	Bier.	Foote	Sel. G.		500		. 2	11/2-21/4	2	Ch.	Op.	No	120
121	43/4x 6 41/4x 53/4	800 900	G-K G-K	1½-King. 1½-King.	Ben. Ben.	K-W K-W	Own Own	Own	Sel. G.	20	565 400	1992	2 2	1/2-21/4 21/2-51/2	17/8 21/2	Ch.	Op. In.	No Yes	121 122
122 123	43/4x 63/4	800	G-K	11/8-King.	Ben.	K-W	Own	Own	Sel. G.	24	360	2160	2	21/2-51/2	21/2	Ch.	In.	Yes	123
124	5½x 6½	750	G	1½-Ben.		Dixie	Own	Own	Sel. G.	11	750	2100	3	13/4-4	21/2	Ch.	Op.	No	124
125 126	4½x 5½ 4¼x 5½	1000 600	K K	11/4-King. 11/4-King.	Own	Eise.	Own Own	Own Own	Sl. G. Sl. G.	12 12	1000	3140 3140	3	23/8-4 13/4-4	23/8	S. G. S. G.	Op. In.	Yes Yes	125 126
127	5 x 6½	750	K	1½-Strom	Ben.	Eise.	B & B	Nutt.	Sl. G.	14	650	2450	2	21/2-4	21/4-23	2 G.		Yes	127
128 129	5½x 6 7 x 8	750 600	K	1½-King. 2 -King.	Ben. Ben.	K-W K-W	Own Own	Own	Sl. G. Sl. G.	14 18	750 600	2750 2700	3	13/4-4 13/4-4	21/2	G. S. G.	In. In.	Yes No	128 129
130	4½x 6	1000	G-K			D.xie		. Foote	Sl. G.	14	592	2150	2	2-3	2-3	G.			. 130
131 132	4 x 6 334x 414	900 1200	G-K G	1¼-King. 1 -Scheb.	Ben. Ben.	King. Dixie	Fuller	Fuller	Fr. Sl. G.	14 9	1065 1000	3900 2350	7 3	17/8-4 13/4-5	3	S. G.	In.	Yes	131
133	9 x12	500	K	2 -Own	Own	none	Own	Own	SI. G.	20	500	2000	. 1	11/2-3	21/4	G.		No	133
124	41/4x 51/2	800	G-K	1 -King.	Ben.	Dixie	Own		Fr.	12	700	2200	7	1-4	21/4	S. G.	Op.	Yes	134
135 136	4½x 6¾ 4 x 6	750 900	G-K K	13/8-King. 11/2-King.	Ben.	Dixie King.	Own		Fr.	14	600 600	2200 2828	7 2	1-4 2-3	21/4	S. G. Ch.	Op.	Yes	135
137	4½x 5¾	1000	K	11/4-King.	Ben.	Bosch	Own	Cotta	Sl. G.	121/2		3000	3	11/2-38/4	21/4	S. G.	Op.		137
138 139	4½x 6¾ 5½x 7	950 825	K	11/4-King. 11/2-King	Ben. Ben.	Dixie Dixie	Own	Cotta	Sl. G. Sl. G.	121/2	810 840	2850 2749	3 2	1½-3¾ 2.4-3¾	21/4	S. G. S. G.	Op.		138
140	8 x10	525	K	2 -King.	Ben.	Bosch	Own	Own	Sl. G.	24	525	3310	2	2-41/2	2	S. G.	Op.		. 140
141 142		1050	G-K	1 -Ben.	Ben.	Dixie	B. & B		Sl. G.	10	1050	2600	2	21/2-41/2	21/2	S. G.	In.	Yes	141
143	1	100 0 900	G K	1 -King.	Ben. Ben.	Dixie Dixie	Fuller	Fuller		10	950		3 2	13/443/4 2-31/2	21/2	G. Ch.	Op.	Yes No	143
144	5 x 6½	850	G-K	1½-Strom	Ben.	Dixie	Own			12 -	850	1838	2	2-21/2	2	S. G.	In.	Yes	144
145 146	-/ 4/ 4	875 950	G K	13/4-Ben. 13/8-King.	Own	Dixie Dixie	Own	Own	Own	16	500 950	2130 3900	1	2½-3 2½-3	2.3	G. S. G.	In. In.	Yes	145
147	434x 634	900	G	King.	Ben.	Eise.	B. & B	3. Own		. 12		. 2700	3	11/4-21/2	23/8	G.	In.		147
148	-1200	1000 1000	K	1¼-King. 1¼-King.	Ben. Ben.	Dixie Dixie	Own	Foote Foote	Sel. G. Sel. G.	14 14	600	2200 2030	2 2	1½-3 1½-3	134-2		Op.	Yes Yes	148 149
150	51/2x 61/2	850	G	1/4-King.	1.	Dixie				12	900		. 2	21/8-23/4	174-2	. G.	In.	Yes	150
151 152		900	K G-K	11/-Bon	Ben.	17-W		0,,,,,,		121/2		9020	. 2	21/4-5	216	G. S. G.	In. In.	Yes Yes	151 152
153	61/2x 7	900 750	G-K K	1½-Ben. 1½-Scheb	Ben. Own	K-W Dixie	Own	Own	Sel. G.	18 14	430 750	2030 27 5 0	2	2½-3½ 2¼-3	21/2	S. G.		Yes	153
154 153	2	750	G	11/4-King.	Ben.	A-K	Bier.	Own	SI. G.	12	750	2358	1	21/4	21/4	R. P.	In.	Yes	154
156	1 -12 - 0	1900	G-K-D K	Strom.	Ben.	Eise.	B. & I	Nutt. B. Foote	Si. G.	16	575	2660	2 2	2½-3½ 1¾-4	$\frac{2\frac{1}{2}}{2\frac{1}{3}}$	S. G.	In.	Yes	155
157 158	434x 61/2	900	K	-King.	Be .	Eise.	Own	Own		. 10	900	2700	1	21/2-81/2	21/2	G.		. No	157
159		700	D	1½-Ens. 1½-Stron	Donal. Donal.		B. & E	3. Own	Sl. G. Sl. G.	Opt.	700 700	2200	3 2	1.5-4 2.06-3.28	2.08			No.	158 159
16		900	K	11/4-Car.					0 1 0		850	2500		1-5	21/2	S.G.	In.	No	160

matic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. Cylinders—Ver., vertical; Hor., horizontal; Easign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter; Perr., Perrin-Ingram. Air Cleaner—Donal., Donaldson; Ben., Bennett; Holl., Holley. Magneto—A-K. 8, Brown & Sharpe; Nutt., Nuttall. Gearset type—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction: Plan., planetary; Sl. J. C., sliding jaw clutch. Final drive—S. G.,

Service Equipment Time Savers of the Shop

Mayo-Skinner Wall Pump

A SMALL wall air compressor for medium service station is being offered to the dealers by the Mayo-Skinner Mfg. Co., Chicago. The pump has the air line directly connected without having the intermediate compressor tank with it. The pump is of two-cylinder type and is air-cooled. The electric motor, which is chain driven and drives the air pump through a chain, is furnished either in direct or alternating current. The hole is mounted upon a hardwood base and is fitted with an electric cut-out switch.

Manley Portable Workbench

The bench shown is a commercial adaptation of the tea wagon recently described in Motor Age. This is manufactured by the United Engine & Mfg. Co., Hanover, Pa. The bench is equipped with tool trays and rolls on large caster wheels. An individual drawer is fitted to the under side of the top. shelf are for various small supplies which are needed often. On the bottom shelf larger articles can be kept conveniently. The wheels are fitted with a screw brake, which locks the bench in any position desired. This portable bench measures 13 in. wide by 44 in. long. The height is 34 in.

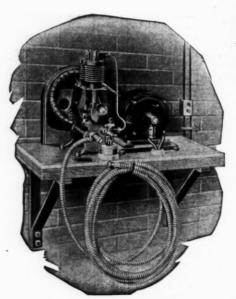
Entorf Straining Filter

The Entorf filter is a mechanical strainer which separates the water and other foreign substance in the gasoline. The filtering process is done by the spring, which is entirely in accord with insurance regulations which prohibits the use of a chamois cloth for straining gasoline. In the Entorf is a

screen near the top so fine that when oil is poured upon it a film is formed through which water will not pass unless forced by considerable pressure. Above this screen is an opening into a drain duct, or vent on the outside of the filter which water can enter. Below the first screen is a second screen and another opening into a drain duct. At the bottom of the filter is a mechanical device so arranged that the oil will pass through into the spout while heavier substances will go into the reservoir which discharges into the drain duct or vent on the outside of the filter. After the desired quantity of oil has been put through the filter the water and other substances can be poured out by tilting the filter downward on the drain side. It is manufactured by the Entorf Filter Co., Amboy, Ill.

Miller Lamp Cabinet

The lamp cabinet shown in the illustration has been designed with a view to a more efficient and convenient method by which bulbs, fuses and brushes can be properly displayed and handled with the least possible chance of breaking by falling from loose cartons, etc. It meets a long-looked-for arrangement for the safer method of handling electrical equipment. cabinet is made of a fine grade of wood, finished in mission style. It has a capacity for over 400 bulbs. The fuse compartment has twenty-four separate spaces which will carry a complete line of all the fuses used in the different cars. A similar compartment is provided for motor and generator brushes. The device is manufactured by Miller Brothers, Louisburg, Pa.



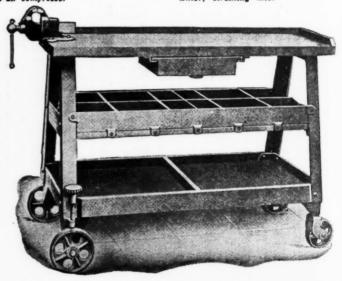
Mayo-Skinner wall air compressor



Entorf straining hiter



Above—Miller cabinet for bulbs, fuses and brushes Right—Manley portable work cabinet for the shop



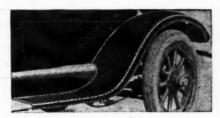
The Accessory Orner New Fitments for the Car

Fender Protectors

THE service station customer dislikes very much to have his car come from the repairshop in a dirty, greasy condition. Protection for the fenders is rendered by the protectors made by Cuop & Scheu, Cincinnati, Ohio. The protectors are sufficiently heavy to protect the surface of the fenders from any tools which might be laid on them. The protectors fit all cars. Three grades of protectors are offered, the enamel drill grade costing \$8.90; the rubber grade, \$12.50; and the art leather which is fleece lined, \$20.50.

Mill City Timer

The Mill City timer for Fords, made by the Mill City Co., Minneapolis, Minn., is a departure from the usual style of timer practice. This timer is geared to the camshaft like all others but has an etxension on it that places it up and out of the dirt and oil. It makes the timer



Cuop & Scheu fender protector

easily accessible and provides shorter wires to the coils. The installation requires about 30 min., it is said.

Replaceable Seat Cushions

New cushions for the car with sagging and out-of-shape cushions are being made by the American Cushion & Spring Co., Kalamazoo, Mich. These cushions have a patented spring in them which the company claims insures the occupants against the uncomfortable jar. The

spring is of a double-deck type. Each of the two decks has a different size wire spring, which prevents contact with the bottom, when riding over rough and bumpy roads. These cushions are made in double sets for the front seats and triple sets for the rear seats. The illustration shows a front seat.

Spring Lubricator

A prospective purchaser for a spring lubricator is in sight every time a car owner drives up to your station with squeaky brakes. The device in effect is a combination spreader and oil feeder. The device is shaped somewhat like schisel and is driven in between the leaves of the spring. The groove furnishes a lead passage for the oil to run into the springs. This device is distributed by the Puritan Machine Co., Detroit, and is sold with an oil can and a can of spring lubricant. The price per dozen is \$5.49.

Columbia Carbureter Designed to Handle Low-Grade Fuel

THE Columbia carbureter is designed expressively to handle low-grade fuel and will be produced in the plain-tube and air-valve types. It has an unusual fuel nozzle and is fitted with an electrical resistance unit that heats the fuel at the point of exit from the nozzle. Another feature is its accessibility. It is possible to remove all the working parts from the shell without detaching the shell from the engine block. Only one adjustment is provided. The float chamber is conventional, differing only in detail. From the float chamber the gasoline flows to the intermediate idling

chamber and from there to the distributing nozzle.

The nozzle is a tube ¾ in. in diameter. The top end of the nozzle is blanked off square. The bottom of the tube screws into the shell of the carbureter. Fuel feed is through a series of holes in the cylindrical surface of the tube, extending for about ½ in along the surface, commencing ½ in down from the top. In the ordinary-type carbureter that is for all car work using a carburetor from 1 in. to 1½ in. in size this nozzle has eighteen to thirty-six holes drilled in it. The holes are

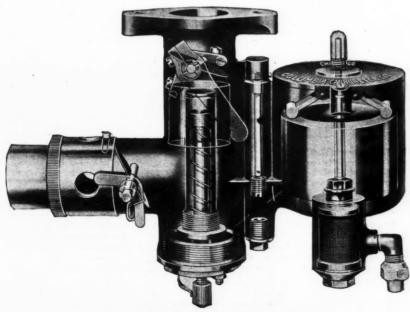
very minute, being made with a No. 80 drill, which is 0.0135 in. in diameter. The holes are in a helical position around the tube, which makes it possible to cut them off from the fuel one by one by screwing down the adjustment plug.

At the very top of this nozzle it will be noticed that there is a V-cut groove. It is the purpose of this groove to break up the fuel into minute particles. The fuel as it is emitted from the series of small holes is swept by the air current upward along the surface of the tube in a thin film.

Inside of the nozzle is a heating unit. This unit is composed of monel metal and has a resistance of about 1.5 ohms. When connected to the lighting circuit it will consume about 4 amp. This wire is wound in spiral form around a silica glass tube. Silica glass has a coefficient of expansion equal to zero and is not, therefore, subject to breakage from the heat. When connected to the battery this wire becomes red hot if left in the open air. When surrounded with fuel this heat immediately is absorbed by the gasoline as it boils away.

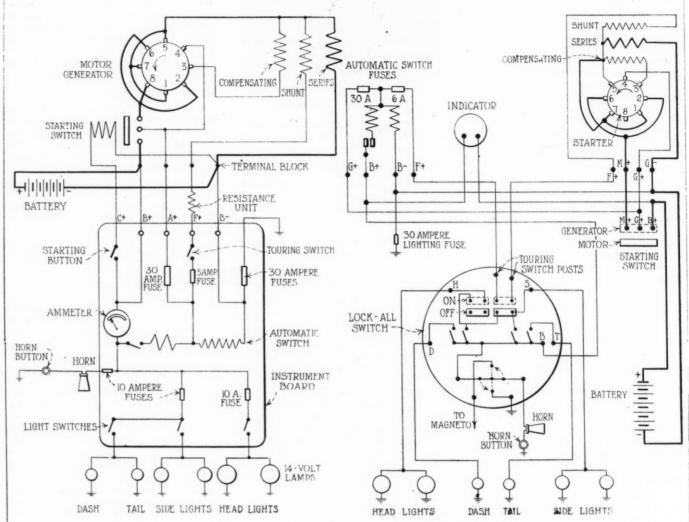
The idling passage located between the float chamber and the main jet is merely a connection or by-pass around the throttling valve. The outlet from the idling chamber is located above the throttle valve and feeds its gasoline through a small hollow tube submerged in the fuel.

The Columbia Carbureter Co., Harris Trust building, Chicago, has spent several years in development work upon this carbureter and will be ready for quantity production soon.



Columbia carbureter, showing its interior construction

Motor Age Wiring Chart No. 43



Wiring of 1916 Mercer using 12-rolt II-S-L system

11-8-1, inherently regulated system

Special Systems for Fords-May 15-22 General Battery Charging-May 29 General Magneto Diagrams-June 5 internal Connections-July 10-17-24

Abbott-March 20-27 Alco—April 24 Alter—Nov. 4 Apperson-March 6 Buick-Nov. 21-April 3Dodge-Dec. 12 Cadillac-Dec. 9 Cartercar-May 1 Cole—Jan. 23-April 3 Empire—March 13 Case—Feb. 27 Ford—Jan. 30 Chalmers—Feb. 20 Chandler—April 3

Crow-Elkhart-June 26 Davis-May 8 Detroiter-March 6 Dort-March 13 Elgin-Feb. 27 Ford-Jan. 30 Franklin-June 19 Grant-Feb. 27-March 27

Chevrolet-Nov. 28-Mar. 27 Henderson-April 3 Hudson-Dec. 5-May 1 Hupmobile—Feb. 13 Interstate—March 13 King—July 3 Kissel—July 3 Krit-Feb. 6 Lexington-April 24 Little-March 20 Locomobile-Jan. 23-Apr. 17 Packard-June 19-July 3Studebaker-April 26

Marion—March 6-20 Mercer—Jan. 23 Michigan-March 20 Mitchell-Jan. 9 Murray-May 1 National—June 19 Oakland—Jan. 2 Oldsmobile-Jan. 23 Overland-Nov. 7-14 Maxwell-Jan. 16-Aug. 14 Paige-July 3

Premier-April 10 Pullman—April 10 Regal—Feb. 6-April 10 Reo-Feb. 27-Aug. 21 Saxon—April 17 Scripps-Booth—Dec. 26 Simplex-April 17 Stanley—June 26 Stearns—Knight—April 24 Velie-April 24 Westcott-May 8

I JEF I

Valve Timing

Motor Age Maintenance Data Sheet No. 51

One of a series of weekly pages of information valuable to service man and dealer-Save this page Measured in Degrees and Minutes

1916 Cars, Concluded

	Inta	ke	Exha	aust	Valve C	learance		Valve	Stems
	Opens After Upper Dead Center	Closes After Lower Dead Center	Opens Before Bottom Dead Center	Closes After Top Dead Center	Intake	Exhaust	Valve Diameter	Diameter	Length
Crawford	10	28	40	2-30	.003	.005	1.734375	.328	5 18
Crow-Elkhart 30	5	37	47	10	.003	.004	1.375	.375	51/2
Davis 6G	0	33	67	0	.003	.005	1.5625	.310	437
Davis 6E	10 10	28 35	40 ‡45	2-30 8	.003	.005	1.734375 1.6875	.328	5 fe 6.531
Dorris I-B-6	10	45	45	10			1.75	.4375	43/8
Porris I-B-W	10	45	45	10			2.125	.4375	43/8
Dort 5-A	†5	37-42	47-18	5	3	3	1.53125	.375	532
Ford T	12-40	50-49	37-52	0	.025	.025	1.421875	.311	4.974
Franklin 8T & 9A	†8	49	51-30	17	.010	.010	1.5	.277	47/8
Glide 6-40	15 5	50 35	45 47	10	.002	.003	1.3125 1.5625	.3125	5 ³ / ₈ 6 ⁵ / ₈
Hudson 6-40	10	28	40	2-30	2	2	1.53125	.375	61/8
Hudson H	7	42	55	8	4	6	1.8125	.375	67/8
Hupmobile N	ó	24	39	5	.003	.003	1.75	.375	717
ordan B	10	28	40	2-30	.004	.004	1.6875	.372	5 43/64
Kissel Kar 6-42	15	50	45	10	.004	.004	1.9375	.4375	7 1/33
Kissel Kar 4-36	15	50	45	10	.004	.004	2.15625	.4375	7 15/33
Kissel Kar 4-32	15	50	45	10	.004	.004	2.15625	.4375	732
Klinekar 6-36-E	12 10	45 28	55	12 2½	.004	.004	1.562	.3125	6 15/64
Lexington 6-N	12	45	55	12	.004	.004	1.375	.372	51/8
Lexington 6-OLexington 6-P	10	28	40	21/2	.004	.004	1.78125	.403	637
Locomobile 38	0	* 5/8	*3/4	*1/8			2.5	.433	73/8
Locomobile 48	0	*3/4	*3/4	*1/8			2.125	.433	8.92
Marmon 41 & 34	19	35	45	12	.003	.003	\$ 2.1875	§ .4375	§ 732
Maxwell 25	5	40	. 35	0			1.9375	1 .375	533
McFarlan X	10	35	45	5					
Mercer	5	55	70	15	.003	.004	2.125	.370	9
Mitchell C-42	15 18	71 50	59	19 50	.003	.003	1.5625	.372	618
Moline-Knight C	20	50	5	20					
Moline-Knight G Monitor M & O	. 0	33	67	0	.003	.005	1.5625	.310	437
National A-C	5	45	55	5	.003	.004	1.5	.372	611
National A-D	5 .	49	55	5	.004	.004	1.375	.341	433
Oakland 38	15	38	45	10	.334	.334	1.625	.375	618
Oakland 50	15	38	45	10	.250	.250	1.5	.375	518
Oakland 32 & 32B	17-30	38 38	42.5	7-30	.5655	.5655	1.125	5/16	5
Overland 75 & 75B	8	38	46 46	15 15	.003	.003	1.5625 1.625	1.750 1.875	8½ 5 %
Overland 83	8	38	46	15	.012	.012	1.625	1.8125	533
Overland 84	6-30	45	40	5					
Overland 86	10	28	40	2-30	.002	.002	1.546875	111	618
Owen-Magnetic O-36	5-30	34	60	31/2	.005	.005	1.6875	.372	732
Owen-Magnetic M-25	10	28	40	21/2	.005	.005	1.546875	.372	61/8
Packard	15	35 50	45 45	4	.0025	.004	1.65625	.359	6 41/6
Paige 6-38	13	30	43	10	.003	.003	1.4375	.3110	5 372
Peerless 56	13	51	51	13			1.75	.372	632
Phiauna	10	30	45	5	.006	.006	1.625	.375	618
Pilot 6-45	12	30 45	45	7	.006	.008	1.5625	.3725	618
Premier 6-51	†8		45	8	.003	.003	1.875	.435	8 th ∫ 4 19/6
Reo R	17.76	36.42	53.30	14.21	.005	.005	1.75	.375	1 5 41/6
Reo M	17.76	36.42	53.30	10.66	.004	.004	1.75	.375	{ 4 19/6 5 41/6
Roamer RAC	15	50 28	45 40	10 2-30	.003	.004	1.3125 1.734375	.3125	51/4 51/4
Scripps-Booth C				2.00	.003	.003	1./545/5	.528	318
Stephens 60	12	45	55	12			1.375	.3125	418
Studebaker	12-30	32-30	45	7-30	.025	.025	1.53125		6 15/
Velie 15	10	28	40	2-30	.025	.025	1.375	.310	532
Velie 22	0	33	67	0	.250	.250	1.375	.310	51/8
Westcott 41	0	33	67	0	.3055	.337	1.53125		6 15/
Westcott 42 & 51	10 21	28 45	40 54	2-30	8	8	2.3125	.4975	83/4
Winton 22	21	45	54	12			1.8125	.435	85/8

*Marked on flywheel +Before: *after: *inches piston travel.

Among the Makers and Dealers Short Trade Notes

A UTO BODY CO. Ships 5500 in July— During July the Auto Body Co., Lansing, Mich., established a new production record when it turned out and shipped 5500 bodies.

Haynes Declares Quarterly Dividend— The Haynes Automobile Co. has declared a quarterly dividend of 1% per cent on preferred, payable Sept. 1 to stock record Aug. 20.

Another Distributer for Mohawk Tires— The Rubber Service Co. has been appointed distributer for the Mohawk Rubber Co. The company is located in Seattle, Wash., and its first carload of tires has been shipped.

McGookin Will Return to Detroit—Earl W. McGookin, vice-president of the M. V. Kelley Co., advertising agent, New York and Toledo, who resigned some time ago, will return to Detroit to resume his work as manufacturers' representative.

Owen Tire Declares First Dvidend—A 7 per cent dividend on the preferred stock of the Owen Tire & Rubber Co., Cleveland, Ohio, has been declared. It is the initial one to be declared by this company and is payable in September to stockholders of record Aug. 15.

General Motors Adds to Olds Punds—General Motors has made another appropriation with which to build a power-plant for the Olds Motor Works at Lansing, Mich. Approximately \$250,000 will be spent on this plant. Work is now under way. The purpose of the powerplant is primarily for fire protection.

To Distribute Stutz in Wisconsin—The Van Etta Motor Sales Co., Milwaukee, Wis., has been organized by J. Van Etta and A. E. Braden to distribute the Stutz car in Wisconsin. The company will maintain a service station in connection with its salesrooms and offices. Mr. Braden formerly was wholesale manager for the Jesse A. Smith Co., Hudson distributor for Wisconsin.

Bacon Meads MoGraw Sales—H. M. Bacon has been appeinted general sales manager of the McGraw Tire & Rubber Co., Cleveland, Ohio. Mr. Bacon comes from the Diamond Rubber Co., where he has been in charge of sales since 1914. The McGraw company recently has opened new branches in Boston, Baltimore, Detroit and Denver and expects to open branches in several additional cities within thirty days.

Packard to House Service Department—Packard has abandoned its plans to build a large auditorium in Detroit. Instead it will erect two large buildings to house its service department and its local salesroom. The service building will be built first. It will be L-shaped with a street frontage of 400 ft. It will be 80 ft. deep, four stories high and have a total floor area of 100,000 sq. ft. The salesroom will be started after the completion of the service room.

Granville Motor Building—The Granville Motor Co., which is owned and operated by the Oxford Buggy Co. of Oxford, N. C., is erecting a building to take care of its sales and repairs of ears, tractors, etc.

The building will be 69 by 172, two stories, with attractive showroom cut off 57 ft. deep in front. It is expected the work will be completed in sixty days.

Dort Opens New York Branch—The Dort Motor Car Co. has opened a branch with sales and showroom in New York. This is its only direct factory branch.

Briggs Adds to Plant Capacity—The Briggs Mfg. Co. has taken a short lease on 30,000 sq. ft. of floor space and will establish a finishing department for closed car bodies.

A. J. Miller & Co. Enlarge—The body manufacturing business of A. J. Miller & Co. will be continued and enlarged by Lee M. Lentz and John W. Grabiel, executors of the estate. H. V. Goodenough, who has been general manager for several years, will be retained in that capacity.

Chicago Pneumatic to Move Offices—The Chicago Pneumatic Tool Co. expects to move its general offices to New York next year into a building they are erecting there. Sales and service organization will be maintained in Chicago. The company operates six American plants and twentysix sales and service branches which can be directed more economically from New York.

How Olds Will Use Reliance Plant—The Reliance Engineering Co.'s main plant, Lansing, Mich., recently purchased by the Olds Motor Works, is to be converted into a department for finishing closed bodies. The plant will be equipped with wooden block floors mounted on a cement base. When completed the addition will double the capacity of the closed body finishing department of the Olds company.

Cleary Again Handles Cadillac Advertising—John Cleary, formerly with the Cadillac Philadelphia branch, is now advertising manager of the Cadillac Motor Car Co., Detroit. He succeeds Lee N. Burnett, who resigned to handle the advertising for the new company being formed by D. McCall White. Cleary handled the Cadillac advertising while Mr. Burnett was in the army, being relieved by Mr. Burnett when he returned to civilian life several months ago.

Connecticut Brings Suit—Suit for the infringement of its Wilcox and Cavanagh patent No. 1204104 has been brought by the Connecticut Telephone & Electric Co. in the United States District Court here against Joseph Weidenhoff. This is the second case brought against the manufacture of spurious parts for its ignition system. The first one against Paul G. Niehoff last December was settled amicably when the company agreed to discontinue the practice.

Canadian G. M. to Export Also—The construction work at the Motor Products, Ltd., plant in Walkerville, Ontario, which is the Canadian branch of the General Motors Corp., is proceeding at such a rate that production will be commenced on a large scale by the end of this year. A company official stated that 2000 men would be employed by Jan. 1. Export of motor cars by this company is included in the program. It is proposed to ship cars to

Great Britain to take advantage of the preference on Canadian-made cars. Axles and gear shafts will be made at the Motor Products plant.

Mitchell Makes Closed Bodies—The Mitchell Motors Co., Inc., is building its own closed bodies for its cars.

Knocke Now With Falls Motors—L. T. Knocke has resigned as experimental engeneer of the Waukesha Motor Co., Waukesha, Wis., to become chief engineer with the Falls Motors Corp., Sheboygan Falls, Wis.

Powrlock Canadian Branch—The Powrlock Co, has completed arrangements for a Canadian branch at Walkerville, Ontario. It will combine a sales office and assembling plant under the supervision of D. C. Nale.

Holden Sails for European Markets—C. S. Holden of the Cleveland Welding & Mfg. Co. has sailed for England, France and other foreign countries to study market conditions in relation to the products of the company.

To Direct Agencies In Five Counties— Harry W. Prince has been named director of Dodge Brothers agencies in five western New York counties by J. A. Crammer, western New York and Pennsylvania distributer of the Dodge line.

General Motors Buys Hastings Concern— The Hastings Consolidated Press & Tool Co., Hastings, Mich., has been purchased by the General Motors Corp. for \$1,000,000. The capacity of the plant will be quadrupled and 1200 men employed.

Guthard to Direct Billmont—E C. Guthard has left for Chicago to take active charge of the Edgar C. Guthard Co. manufacturer of Billmont wrenches. Hedisposed of his interest in the Northwestern Auto Supply Co., Billings, Mont. which he organized in 1914.

Brownless Is McGraw District Manager—Harry C. Brownless has been appointed district manager for the McGraw Tire & Rubber Co., with headquarters at the new Detroit branch. He took up his new duties after spending nine years with the Goodyear organization.

Reller Joins Buck & Hammesfahr—Ralph E. Keller has joined Buck & Hammesfahr, advertising agents, New York Chicago and St. Louis. Mr. Keller has been associated with the advertising of Willys-Overland, Peerless, Cole, Stewart-Warner. Republic and Garford trucks. Federal tires, Standard parts, etc.

Barnewall with Barney Co. Mow—C. F. Barnewall, formerly with the Chalmers Motor Co. of Canada and during the war engaged on production of Liberty engines at the Aluminum Castings Co. plant in Detroit, has become manager of the Barney Sales Co., Detroit, distributor in Michigan and northern Ohio for Blue Streak spark plugs and other devices.

Case Adds New Distributer—The Indianapolis branch of the J. I. Case Plow Works has made a contract with the Hancock Buick Co., Findlay, Ohio, to handle Wallis tractors and J. I. Case power farming implements in northwestern Ohio. Arangements also have been made with the Columbus Hay Press & Storage Co., Columbus, Ohio, to exhibit the full J. I. Case line on its sample floor.

Pirestone Promotes Branch Manager—P. H. Talbott, branch manager of the Kansas City Firestone office, has been made district manager, and Dave Rosser, formerly factory representative, becomes branch manager.

Lay Becomes Special Franklin Engineer—Robert P. Lay has been appointed special engineer in the engineering department of the H. H. Franklin Mfg. Co., Syracuse, N. Y. He was formerly assistant chief engineer of the Curtiss Engineering Corp., Garden City, N. Y.

New Orleans Dealer Adds to Line—The Liberty Automobile Co., prominent in New Orleans trade circles as distributers of the National car and the Kelly-Springfield truck, has taken over the agencies for the King eight and the Elcar. L. Villeo is president of the company.

Jepson Leaves Pactory to Distribute Cars—F. L. Jepson, for two years district sales manager for the Willard Storage Eattery Co., with headquarters in San Francisco, has resigned to go with the Southwell-Hunter Auto Co., Stockton, Cal., distributer of Chandler and Cleveland cars.

Consulting Mathematicians Form Company—Dantzig, Pfeifer & Ritt have organized a firm of consulting mathematicians, claimed to be the first organization of its kind to enter the commercial field. They will endeavor to solve mathematical problems in mechanism, diagram and chart work, and problems in aeronautics among other investigations.

Automotive Concern Prepares for Trade—The Thomas J. Dugan Co., New Orleans, La., formed recently with T. J. Dugan as president and Capt. Peter Hamilton, vice-president, will handle Briscoe cars, Mobile tractors and Gary trucks in addition to the new Kline car, made at Richmond, Va., which this firm is distributing in this territory.

Southern Dealer Body Grows Rapidly—Southern Louisiana dealers are affiliating rapidly with the Louisiana-Mississippi Automotive Trades Association. During the week ending August 10, branch associations were formed in Jeanerette, New Iberia, Franklin, Crowley and Jennings. Hundred per cent branches are the rule. C. U. McDowell, secretary and general manager, is on tour of the state, organizing these branches.

Handling Parts 100 Miles by Truck—When traffic on the railroads was interrupted by the strike, Charles S. Starr, Ford distributor at Decatur, Ill., established a twice-a-week truck service between that city and St. Louis, Mo., a distance of 100 miles, and was able to keep his patrons supplied with parts, and also handled considerable other business, sufficient to make the service self-supporting. The success of this enterprise has determined Starr to make it permanent, and it will be maintained as long as the roads are passable.

Republic-Dayton Company to Expand—The Republic-Dayton Motor Sales Co., Dayton, Ohio, will erect a modern garage and sales building. Work will be started on the building soon and it is expected that the company will move in before late fall. When complete the building will be one of the most modern sales rooms and service stations in the state. Every detail has been worked out prompt and efficient service can be given at all times.

It is estimated that the cost will approximate \$75,000. The company handles the Republic truck and the Moon and Cole cars.

Goodyear Little Book Branch—The Goodyear Tire & Rubber Co., Akron, has opened a branch in Little Rock, Ark. W. H. Estor is manager of the branch.

Cleveland Office for Thermoid—The Thermoid Rubber Co. has opened sales offices in Cleveland, Ohio. H. R. Portugal will be in charge of sales and Carl A. Schell in charge of engineering.

To Distribute Rewitt Products—The Byrnes Rubber Co., a subsidiary of the Byrnes Belting Co., a long-established St. Louis concern, has been formed to distribute the Hewitt tires and inner tubes in Missouri, Kansas, Oklahoma and Southern Illinois.

Winton Distributer Mas Reorganized — Victor A. Von Arx has reorganized the Von Arx Automobile Co., St. Louis, Mo., Winton distributer, with himself as president, Oscar G. Roeder, secretary and treasurer, and Charles H. Diel, vice-president. L. G. Schubert recently retired from the business

Pharis Tire Will Add Space—The Pharis Tire & Rubber Co., Newark, Ohio, has purchased an additional five acres adjoining its plant, and will erect an addition which will give 45,000 sq. ft. of floor space. The capacity of the plant after the completion of the addition will be 1,000 tires and 1,000 tubes daily.

Oneida Truck Promotes Long—W. J. Long, Peoria, Ill., of late district representative of the Oneida truck, in charge of the central Illinois territory, has been promoted to state representative and will have charge of the entire Illinois territory. He will divide his headquarters between Peoria and Springfield.

Wheel Manufacturer Changes Name—Zwick & Greenwald Wheel Co., Dayton, Ohio, has changed its name to the Automotive Wood Wheel Co. of America. The assumption of the new name does not carry with it any change in the status of the company's employes. The future business policy of the company will be the manufacture of motor car wheels exclusivly.

Boat Club to House Cars—The Southern Yacht Club is having plans prepared for the construction of garage sheds capable of accommodating 400 cars, with covered walks leading to each boat pier in the club pen. The club now has 2500 members, has appropriated the money for a \$250,000 elubhouse to take the place of the present structure on Lake Pontchartrain, and will devote \$25,000 to repairs and improvements of the boat pen, of which the new garage will be part.

Smith Heads Mack Branch—James C. Smith has been made manager of the St. Louis branch of the Mack truck, succeeding Howard C. Bailey, who has been transferred to the advertising department of the Mack factory in New York. Smith joined the St. Louis Mack forces early in the year after having been discharged from the war service. Previously he was manager of the Mack branch at Duluth, Minn. Bailey will take a vacation before assuming his new duties.

Largest Ford Agency in State—A. L. Bell Isle, who in addition to operating the largest taxicab business and the largest garage in Atlanta, Ga., formerly operated a Ford agency in the suburban section, has opened a Ford sales and service station in Atlanta. More than 70.000 sq. ft. of

moor space now are devoted by this firm exclusively to Ford sales and service. It maintains what is reputed to be the largest Ford service station under the Atlanta branch of the Ford Motor Co.

To Distribute Bodies in Michigan—Dudley H. Luce has become distributor for central and northern Michigan for the Detroit Weatherproof Body Co., Pontiac. Mich.

Kansas City Marmon Branch Sold—The Kansas City branch of Nordyke & Marmon has been sold to a new corporation, the Ellwood Motors. A. L. Ellwood was formerly branch manager.

Filmore Is Transferred by Ford—Eylar M. Filmore, assistant branch manager of the Ford Motor Co., Los Angeles branch, has been made manager of the Cleveland branch of the Ford company.

Will Handle Dodge—F. K. Boggs, formerly of Texas, has taken over the Dodge Brothers agency for Montgomery, Green and part of Warren and Butler counties in Ohio. He has opened a salesroom and service station at Dayton, Ohio, where he will make his headquarters.

Gets Marmon Agency—Nordyke & Marmon have appointed B. J. Borchers, Dayton, Ohio, distributer of Marmon cars for Montgomery and eight adjoining counties. He will make his headquarters in Dayton, Ohio, and in addition to the Marmon will handle his old standby, the Saxon.

Dayton to Get New Garage—The Memorial Garage & Sales Co., incorporated recently at Dayton, Ohio, will erect a four-story, modern garage. The upper stories will be devoted to storage space, in which the organization will specialize. Several makes of cars also will be handled by the company.

Kokomo Opens Atlanta Branch—The Kokomo Rubber Co., Kokomo, Ind., has opened a direct factory branch in Atlanta, Ga. W. H. Harris, district manager for this concern, states that a factory branch was necessary to care for the business in the southeastern states. H. M. Booth will be branch manager.

To Distribute Crow-Elkhart in Connecticut—George H. Clark of Silver Lane, Conn. has taken a contract for distribution of the Crow-Elkhart in Connecticut with the exception of Fairfield county. Headquarters will be at Hartford, where he will open a salesroom and service station as soon as a suitable location is found.

Wide Territory for Pan-American—The Pan-American Auto Sales Co., Atlanta, Ga... has been made distributer for the Pan-American in that city and also have Florida, Alabama and Georgia. The concern is open for territory in Alabama and some sections of Georgia. The men behind the distributing organisation are J. B. Stovali and B. L. McCoy.

Distribution for Detris in Georgia—The distribution in Georgia for Dorris cars has been let to the Bergman Motors Co. in Altanta. This company for some time has been exclusive truck distributers and has built an enviable reputation for service to Federal truck owners. Shortly it will occupy one of the best appointed sales and service stations in Atlanta.

Thornton to Distribute Moon in Georgia—Nathaniel Thornton, sales manager of the Superior Motor Truck Co., whose factory is in Atlanta, has resigned to become general manager of the Victory Motors Co., recently organised to distribute Moon cars in Georgia. Mr. Thornton has been sales manager of the Superior factory since its organisation in 1912.

Trom the Tour Winds Climpses at the World of Motordom

Hembership of Buffalo's Automobile ('lub has been increased to 5430. During a recent membership campaign 1757 new members were added to the ciub.

Establish Brussels-Paris Air Service-A daily air service for passengers and merchandise has been cstablished between Brussels and Paris. It is expected postal service between the two cities will soon be added. The airplane used is Breguet single engine machine which makes the trip in about 2 hrs. The number of passengers is limited to two, single fare either way being \$51.16 at normal exchange rate, \$35.33 at prestint exchange rate. Merchandise is transported at the rate of 29 cents per pound at normal rate of exchange. A similar service between Brussels and London will be established when the English severnment grants permission for civilian machines to make the trip. The Belgian government will begin within a few weeks an air service in the Congo, from the coast of Stanleyville, in which hydroplanes will be used.

Dai H. Lewis Would Check Thefts-Dai H. Lewis, secretary of the Automobile Club of Buffalo has submitted to the New York Motor Federation recommendations which, he believes, if enacted into laws, would greatly reduce car thefts. He recommends that police officers, constables and state troopers be authorized to hold for thirty days cars found with the serial numbers removed or altered. Another recommendation is that it be made a misdemeanor for any person to have possession of a upon which appear defaced numbers or from which numbers have been removed. It would be required that every motor car sold in the state have the serial number stamped on five different parts, not put on attached plates. Other recommendations provide for inspection of cars bought and sold and certificates of purchase with full records of the sale and particulars of the transaction. Dealers would be compelled to keep complete records of all motor car transactions.

Tent to House Cars at Louisiana Fair-The South Louisiana Fair Association, whose exhibit opens at Donaldsonville, Oct. 2, has offered all the dealers of the state space in a huge tent, covering 10,000 sq. ft., for any and all exhibits, with special preference for trucks and tractors. About fifty dealers are expected to make exhibits.

Detroit Lacks Municipal Garage centralized municipal garage for the housing and care of all city-owned motor vehicles is advocated by the department of motor transportation as the only solution of Detroit's motor ills. Eighteen city departments operate motor cars, nine of them without any city supervision. Sixtysix machines are garaged by the operators The police department, in their homes. operating 173, has rented a garage which is inadequate for its needs. The public lighting commission has a five-car garage take care of twenty-three machines. Detroit is the first city to install a department of motor transportation. Cleveland and Boston have departments under process of organization

Aerial Service Covers Four States-M. E. Grevemberg, New Orleans, La., and R. Neal, Dallas, Tex., who recently formed the Triangle Air Service Association, with headquarters in Dallas, and have been operating two Curtiss biplanes in passenger service, have formed the Interstate Aerial Mfg. Co. to include regular passenger service between Texas. Louisiana. Mississippi and Arkansas. Aerial service of the Triangle Co. was opened in July and landing field established in the outskirts of Dallas. Both were in the air service of the American army and formed a partnership immediately on being released from service. Both are licensed air pilots.

Bowman to Manage Standard Sales -R Rowman, for several years western representative of the White Co., and more recently connected with the Denby Motor Truck Co., has been appointed central sales manager of the Standard Motor Truck Co.. Detroit.

Here Comes the Motorized Circus-The American Combined Motorized Circus Co. has been incorporated with a capital of \$100,000 to operate a completely motorized circus. The first performance of the circus was held in Columbus, Ohio, recently and it is planned to make an extensive trip through Ohio and adjoining states during the remainder of the summer and One of the novel features will be an entirely motorized circus parade.

Bice Growers Buying Tractors-Rice growers of Acadia parish, the center of the rice industry of Louisiana, have spent \$1 .-381,600 for tractors, trucks, engines and threshing outfits so far this season, according to W. H. Moore, secretary of the Crowley chamber of commerce. The value of the tractors and trucks purchased is not separated from that of the engines and threshers but is estimated at more than half the total.

Ton of Hay 8 Miles by Truck-Practical use of the motor truck was demonstrated in a striking way in Venango County. Pennsylvania, when a farmer hauled more than a ton of hav from his farm to Oil City on a truck temporarily equipped with rigging. It required only 40 min, to cover the distance of 8 miles over an unimproved road. The hay was brought direct from the field and though hay is retailing at \$40 a ton, the price in this instance was \$26, owing to the fact that extra work in stacking and storing was saved.

New Orleans Police Organize Against Thefts-With car thefts in New Orleans averaging two a day the superintendent of police has established a bureau to facilitate the tracing of stolen cars and the capture and conviction of auto thieves. Men from the detective branch are being placed in charge with motorcycle and foot patrolmen under them, so the new bureau is virtually a small police department in itself whose work is devoted entirely to the protection of cars, owners and dealers. He also is urging on the insurance companies the establishment of a mutual exchange for the registration of all insured cars, giving the engine number and description of the car as well as the license number, this exchange to receive reports of all thefts simultaneously with the police department. Such an exchange would get from the state government descriptions and numbers of all licensed cars and all insurance companies to which application is made by a car owner for insurance, thus could trace the car to be insured from its original sale by the dealer down to the present owner. Marking of cars with the owner's initial or by a secret mark filed with the police bureau also is urged.

Coming Motor Events

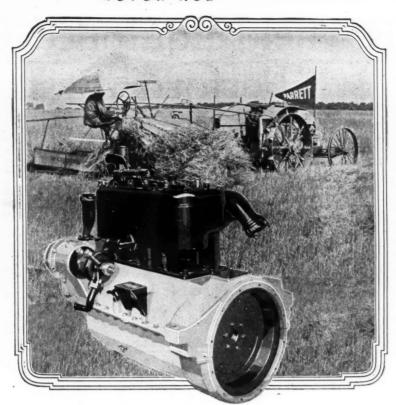
TRACTOR DEMONSTRATIONS

Los Angeles, CalRegional	Demonstration	. September
Streator, IllNorthern	Illinois Association	.Sept. 9-12
Ottawa, OntarioTractor a	nd Farm Machinery	.Oct. 14-16

RACES

Uniontown, PaSpeedway	Sept.	1
New YorkSpeedway		20
Cincinnati, OhioSpeedway		1

shows
Toronto, Canada Canadian National Exhibition
Greenville, S. C Farm Implements and Tractors Sept. 1- 6
Cincinnati, OhioAutomobile Dealers' AssociationSept. 13-20
Springfield, Mass Eastern States Exposition Sept. 15-20
Waterloo, IowaBlack Hawk County Motor Trades BureauSept. 22-28
DetroitDealers' Association, closed car salonOct. 6-11
ChicagoAutomotive Equipment Association
New YorkJan. 3-10
Chicago
Kansas City, MoKansas City Tractor ClubFebruary
Wichita, Han



—its power made it possible

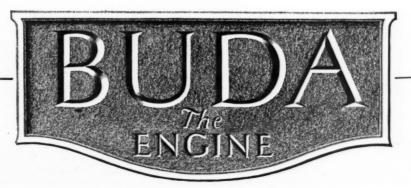
RECENTLY at the National Tractor Demonstration, Wichita, Kansas, a Buda-equipped Parrett tractor completed the harvesting and threshing of a 127-acre wheat field in 113 hours 59 minutes running time.

Using kerosene as fuel, the Buda engine maintained an average of 1.11 gallons per acre for harvesting and 1.07 gallons per acre for threshing. Total fuel cost ran slightly above 14 cents per acre.

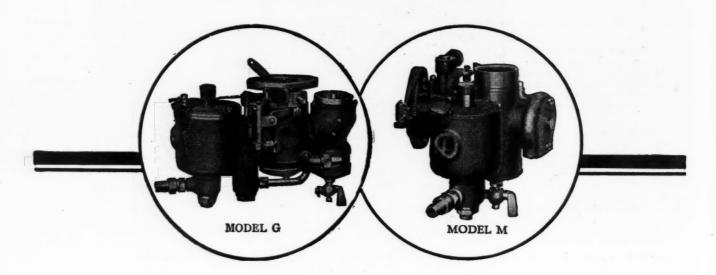
This remarkable record of sustained performance and economy in the severest type of service is scarcely surprising in view of the 38 years' engineering research that has gone into the making of the Buda engine.

Dealers who sell Buda-equipped trucks, tractors and passenger cars have long recognized as an advantage that freedom from mechanical trouble which is a pronounced characteristic of Buda engine design.

THE BUDA COMPANY, Harvey (CHICAGO), Ill. ESTABLISHED 1881



Rayfield Equipped Cars Perform Best



Rayfield Carburetors develop the maximum powerinthe motor.

Experienced motorists prefer a car equipped with a Rayfield, because they know such a car shows better in performance.

The Rayfield Carburetor will send the car ahead in an emergency. It will take it over the roughest roads and steepest hills without faltering. At the same time, it is acknowledged more economical of gasoline. These are the qualities the motorist looks for when selecting his car.

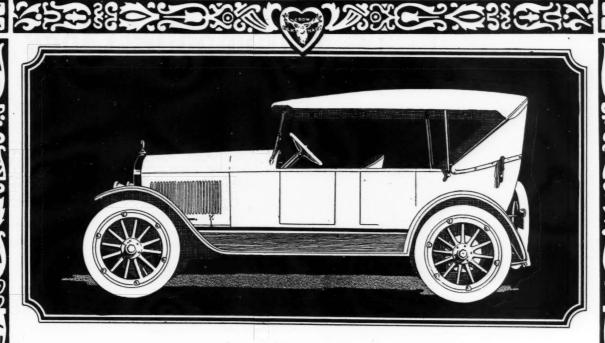
Rayfield superiority of performance is recognized everywhere. Many of America's finest cars now have Rayfield Carburetion.

Although the first cost is greater, motorists know that the results in performance and economy of operation justify the added expenditure.

BENEKE & KROPF MANUFACTURING CO.

Successors to Findeisen & Kropf Manufacturing Co. 21st and Rockwell Streets, Chicago, Illinois





A Car of Consummate Beauty

The 1920 Crow-Elkhart Six sets new standards in motor car beauty. Outstanding verve and grace of design are supplemented by motor coachwork of surpassing excellence. Crow-Elkhart bodies are fashioned with almost loving care by a coterie of professional coach-builders widely known for the excellence of their workmanship. In the great Crow-Elkhart shops these skilled craftsmen individualize every Crow-Elkhart by a custom finish. Ten colors with upholstery to match are optional with each purchaser.

CROW-ELKHART Multi-Powered

Crow-Elkhart 1920 Six—5 Pass. Touring Car, \$1545; 1919 Six—5 Pass. Touring, \$1345; Six—2 Pass. Roadster, \$1345; Six—5 Pass. De Luxe Tourster, \$1405; Six—4 Pass. De Luxe Roadster, \$1405; Crow-Elkhart Four—5 Pass. Touring, \$1145; Four—2 Pass. Roadster, \$1145; Four—5 Pass. De Luxe Tourster, \$1205; Four—4 Pass. De Luxe Roadster, \$1205.

Write for catalog containing full information.

CROW-ELKHART MOTOR CORPORATION, Dept. 101, ELKHART, INDIANA Export Department, Broadway at 53rd St.,

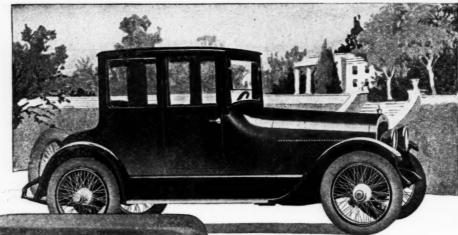
New York City, U. S. A.

DEALERS will immediately recognize the new opportunity that The Crow-Elkhart Multi-Powered Line offers. Desirable territory is still open. Write today for particulars about our attractive dealer franchise



The Waltham Automobile Clock

More Than a Quarter Million Now in Use as Standard Equipment



Haynes Coupe Equipped With Waltham Automobile Clock

The luxurious enclosed car requires an artistic and beautiful clock to make it complete.

And just as the car must be sturdy and serviceable as well as good to look at, so must the clock be accurate and reliable as well as beautiful.

The Waltham Automobile Clock can be depended upon for perfect accuracy because it is scientifically constructed for service under all road and weather conditions.

It is an eight-day clock, jeweled, and with two mainsprings. An added feature is the red signal which flashes on the dial on the seventh day to give warning that winding is needed.

You will find Waltham Automobile Clocks used as standard equipment by the makers of some of America's finest cars. Could there be better proof of their excelling quality?

WALTHAM, MASS.

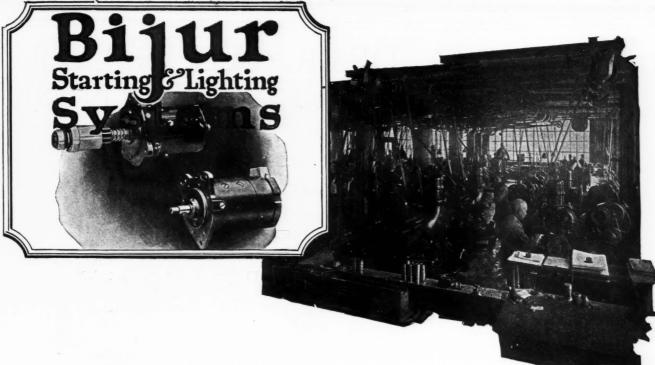


List of Cars Carrying Waltham Clocks as Standard Equipment

Anderson 6-40
Apperson
Brewster
Cadillae
Cole
Cunningham
Detroit-Electric
Dorris

Franklin Haynes Hollier Hudson Super-Sir Jordan Kissel Locomobile Marmon Mercer Owen-Magnetic Packard Pierce-Arrow Rauch & Lang Studebaker Willlys-Overland Winton

WALLTH OVER TIME





The Bijur Starting and Lighting

System is in Service on

Passenger Cars
Motor Trucks
Motor Boats
Seaplanes
Dirigible Balloons
Tanks

How Bijur Quality Is Maintained

THE Bijur plant is a complete plant.

In it is made every part that goes into the construction of Bijur Starting and Lighting Systems.

There is no other way to insure the Bijur quality that won the support of Government engineers—the quality that resulted in the adoption of Bijur Equipment for Liberty Moors—

The same quality that marks the starting systems of Packard, Winton, Marmon, Apperson, Peugeot and other cars of the finer class.

All ten stories of the big Hoboken plant are devoted to Bijur manufacturing—exclusively.

This means assurance of a proper Bijur standard—and deliveries according to promise.



WHO IS A DESIRABLE DEALER FOR THE NEW 1920 HAYNES?

HERE are thousands of car users who know the ins and outs of automobile making. They know engines, transmissions, body designs—they know performance—their knowledge is based on experience.

It is this class of automobile owners and users that has set the seal of approval on the new 1920 Haynes character cars.

They appreciate its distinctiveness in combining the four factors of car-character—beauty, strength, power and comfort.

And they know that this character is not superficial—they know it exists inwardly as well as outwardly.

Consequently the demand for the new 1920 Haynes character cars continues to be several hundred cars ahead of the supply every day.

A desirable dealer for a car having this reputation and enjoying this unbroken demand is evidently one whose reputation, ability and commercial standing is on a par with the high favor accorded the Haynes.

Such a dealer is permanent. In some sections—good territory—we are ready to consider establishing new dealers of this class.

If you are one of them, please write or wire us. The foundation for a continuous, profitable business is laid for you.

In writing, or wiring, address Dept. 851

The Haynes Automobile Company, Kokomo, Ind., U.S.A.

The Haynes, AMERICA'S FIRST CAR, now exhibited by the government at the Smithsonian Institution, Washington, D. C., was invented, designed and built by Elwood Haynes, in 1893.





Every dealer knows the trouble every car owner has with carbon. He knows the success that awaits the successful means of destroying carbon formations, removing them permanently. Now-

Science Conquers Carbon Plague

Monox Carbon Destroyer to dealers and owners alike is the most important automotive achievement since the vacuum system-a scientific solution of the carbon problem that chemists have been working on

The Monox Carbon Destroyer is scientifically correct. Installed on any car it removes the carbon from every cylinder, and

Monox Fits All Passenger Cars, Trucks and Tractors. Anyone Can Install It. Comes complete with all fittings and directions for attachment.

A big seller—with actual profit possi-bilities greater than decarbonizing the old way. One model fits all cars, and repeat business on Monox Compound keeps you in contact with your customers.

Monox is entirely different from all old methods of decarbonizing. There is nothing else like it on the market. There is no competition to overcome. Any car owner can easily be sold on this \$10.00 investment to rid himself of carbon trouble forever. Ideally adapted for priming purposes with gasoline, or gasoline and ether, and a better primer than you have known



ans and quarts

The Motor Continuously Cleans Itself

Here's how Monox—the successful carbon destroyer— perates. When the motor is running open the regulating valve (V) slowly until the gauge shows a few drops of liquid being drawn into the motor. Leave the regulating

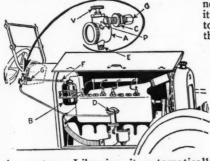
valve set. It is not necessary to shut it off when the motor is stopped, as the supply stops automatically with

Offers Jobbers and Dealers Big **New Sales Opportunity**

Dealers: Look over the cars in your territory. Nearly everyone of them in some measure needs decarbonizing today. Everyone of them will need decarbonizing soon.

It is easier for you to sell Monox Carbon Remover than it is to meet the demand for decarbonizing in any other way. Monox sales pay.

Jobbers: Everyone of your dealers will want to know about Monox, to solve the decarbonizing problem. Be ready to meet the demand.



ON 30 DAYS' TRIAL
Install a Monox Carbon Destroyer on any customer's car for 30 days. You will find that it won't come back—but if it does refund the purchase price in full. We will do the same for you. This 30 day trial sells. Try it.

the motor. Likewise, it automatically graduates the amount of liquid used, at various speeds.

No bother, and the expense is trifling.

Monox Compound contains certain ingredients that not only destroy carbon, remove gum from piston rings, and improve combustion, but also continuously lubricate and

MONOX COMPANY тне Detroit, U. S. A. Offices-502 Book Bldg.

USE THE COUPON NOW

The Hewitt Ideal

To build tires and tubes that shall honor the Hewitt name by making well satisfied users and permanently prosperous dealers—

-That is the Hewitt ideal

Hewitt Cord and Fabric Tires and Hewitt Tubes reflect that ideal in unusual mileage.

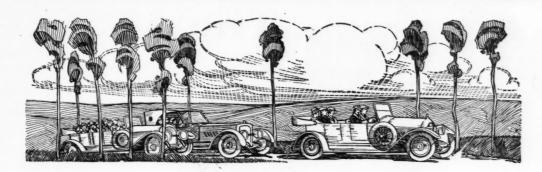
Dealers, distributors and users reflect it in enthusiastic satisfaction.

HEWITT RUBBER COMPANY

Factory and Executive Offices at Buffalo, N.Y.

New York Chicago Boston Denver Philalelphia San Francisco





BUYING OIL

Buying oil by the quart, as needed, may be the easiest way, but not always the best. Of the hundreds of brands there is sure to be some low grades. The safest method is to specify

SUPREME AUTO OIL

You get a good lubricant which leaves less carbon in the cylinders.

There is MORE POWER in That GOOD GULF GASOLINE

Ask any dealer at the sign of the Orange Disc

GULF REFINING CO.

New York Atlanta

Philadelphia New Orleans Boston Houston

General Sales Office: PITTSBURGH, PA.

Saving Time With The ATSCO-



The saving of time made by having an Atsco Portable Air Tank is fully appreciated only by those who use it.

The Atsco saves first because it can be moved from place to place with little time or trouble.

10 inches diameter, 36 inches long, with solid grip. The photo shows the outfit complete.

For twenty-four hours every day it replaces the slow, uncertain hand pump with the unfailing swiftness that only the Atsco can insure.

Atsco Portable Air Tanks, for road repairs, are genuine copper brazed. They are the tightest, safest, strongest tank it is possible to construct by any known method. Designed for 250 lbs. working pressure and 500 lbs. test pressure.

The outfit comes to you all ready for use. Simply fill it with air, from your compressor or tank, and it is ready for work. Price \$24.50 f. o. b. Pittsburgh. Will pay for itself in two months on the labor saved. Order one today. Hundreds of satisfied users.

AGCO)

Air-Tight Steel Tank Co.

Main Office and Works

PITTSBURGH

PA.

PORTABLE. AIR TANK

GRID IRON

Grip Sure on all Roads

for all Motor Driven Vehicles-

There is a Kokomo tire and tube for every type of motor driven vehicle. This is an added reason why car owners call at the Kokomo tire store first. To you it means that a certain amount of business is actually forced to your store.

Kokomo tires and tubes are nationally advertised and we will spend a large amount of money in your own town, advertising in your own local newspapers and on billboards, WITHOUT ONE CENT OF EXPENSE TO YOU. Each advertisement will feature your name connected with our Kokomo products in such a way that you will reap the benefit of National and local advertising and enjoy an immediately good and continuously increasing business.

Will you be the Kokomo dealer in your town and sell this low priced high quality tire?

KOKOMO RUBBER COMPANY

"A Quarter Century of Leadership"
KOKOMO, INDIANA

TOKOTO TIRES
TOKOTO TUBES

5000 MILE GUARANTEE

Here is a rebuilt tire proposition that no dealer who is looking for quantity sales at a liberal profit can afford to overlook. Read the facts and then act.

- ¶ For approximately three years we have been in the business of collecting used tires and rebuilding them into a long period of usefulness.
- ¶ In this time we have built a factory of imposing size, fully equipped and adequately manned. It follows that our success has only been made possible because we are turning out tires that afford the user long tire life and remarkably low price—and the dealer commissions above the ordinary.
- In selecting used tire for rebuilding, we eliminate those that are worn to an extent that would not offer a solid foundation. Those selected are rebuilt clear from the foundation to the finished tread, with care and attention to detail that insures a tire with thousands of miles of in-built service.
- ¶ It pays dealers to sell this dependable "factory-rebuilt" tire. This tire appeals to the economical buyer, by reason of the low price. Thousands of users can testify as to its dollar saving qualities.
- Get in touch with us. Our prices will appeal to you our tire will build trade which could not be possibly had in your territory through any other moderately priced tire proposition.

OVERLAND TIRE COMPANY

15-25 RIVER STREET

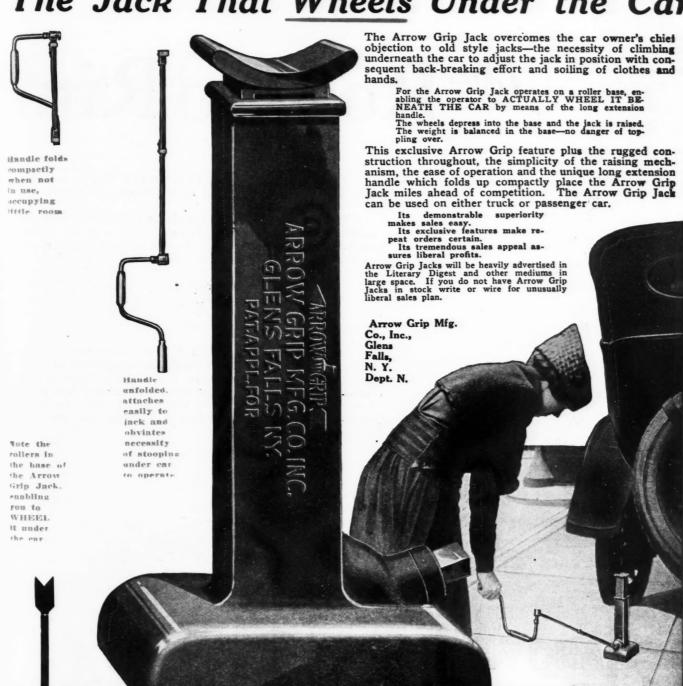


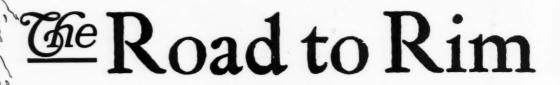
NEWARK, NEW JERSEY



JACK

The Jack That Wheels Under the Car





The Goodyear Type A Demountable Rim is made by The Cleveland Welding and Manufacturing Company.

This rim is simply the Goodyear Detachable with the addition of the demounting feature. Tire is firmly locked on the rim by the side ring. Rim is secured to the wheel by drawing the clamps tight.

Tire can be removed from the rim as easily when it's on the wheel as when it's off, by lifting the side ring from its groove. Inflation pressure locks the side ring firmly around its entire circumference.

Dependable service is built right into these rims. From selection of raw materials through final inspection of completed product, every operation is under the direct supervision of our own men. These men know exactly how good demountable rims should be constructed and take keen personal interest in seeing that these standards are met.





Satisfaction!

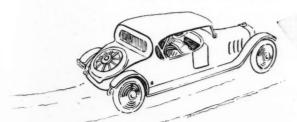
By reason of their standards, the ease of tire changing, and the increased mileage they give tires, Goodyear Demountable Rims are in demand. Dealers will find it profitable to stock up with these rims.

Cleveland Welding products include Goodyear Detachable Rims for Wire, Disc and Wood Wheels, Goodyear Demountable Rims, Standardized Demountable Rims, Clincher Rims, Tire Bases for Solid Tires, Flanges, and Motor Truck Wheel Bands; Gear Ring Forgings, Special Electrically Welded Rings, Special and Irregular Shapes of Tubing.

THE CLEVELAND WELDING & MFG. CO. of THE HYDRAULIC PRESSED STEEL CO. Cleveland, Ohio

BRANCH SALES OFFICES:

New York Singer Building Detroit Book Building Chicago Fisher Building





"Hydraulic men will tell you that Hydraulic is 'MORE than a Place to Work.' The men themselves have made it so, through their own interest in accomplishment. Hydraulic products are made by men who take an interest in their work. In quality these products represent interest, thought and care by the workman and not merely a task completed."

8 Of the Hydraulic of the Hydraulic operation of the Hydraulic operation. Pressed Steel Co.

The automotive industry recognizes the founder and present head of the Champion Ignition Company as the highest authority on spark plugs.

He is the pioneer. He has been identified with the automobile and its development since the earliest days of the industry.

He knows what spark plugs should be, and the automotive industry knows that he knows.

The leading engineers come to him with their ignition problems, always confident that he will effect a solution.

In competitive tests running through two decades of progress, his spark plugs—AC Spark Plugs—have proven the most dependable.

As a result, AC's have been

adopted as standard equipment on most fine makes of passenger cars, and on most motor trucks and tractors of established reputation.

Like the many automobile manufacturers who specify AC's for their cars, thousands of dealers have found that it pays to sell spark plugs that are designed, developed and made under the supervision of this pioneer.

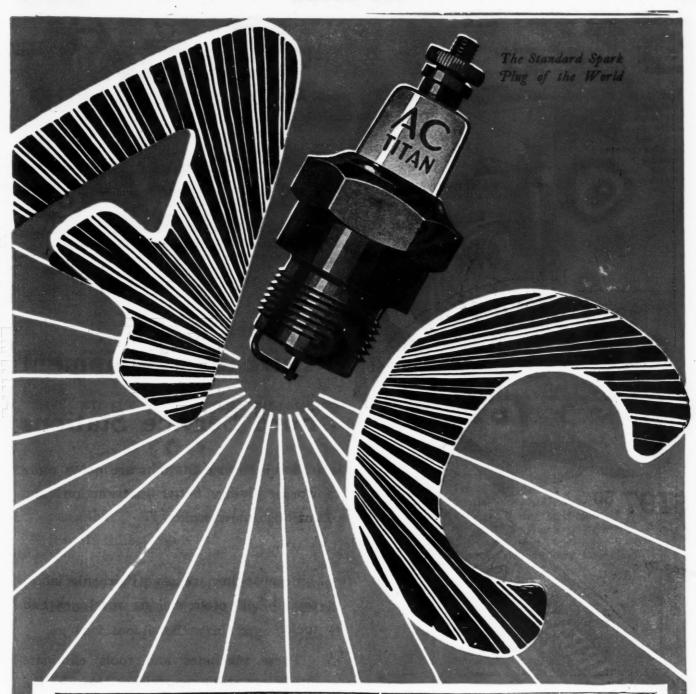
They are profiting from the intrinsic goodness of AC's. Their sales are being constantly stimulated by convincing AC advertising. Complete dealer information sent on request.

Champion Ignition Company, FLINT, Michigan

U. S. Pat. No. 1,135,727, April 13, 1915.

U. S. Pat No. 1,216,139, Feb. 13, 1917.

Other Patents Pending.



These manufacturers use AC Spark Plugs for factory equipment

Acason Trucks
Acme Trucks
Advance-Rumely
Tractors
Ahrens For Fire
Trucks
American-La France
American Trucks
Anderson
Appleton Tractors
Atco Trucks
Auburn
Avery Tractors
Bates Steel Mule
Tractors
Beck-Hawkeye
Trucks
Bessemer Trucks
Bessemer Trucks
Betz Trucks
Briggs & Stratton
Motor Wheel
(formerly the
Smith)
Brockway Trucks
Buffalo Motors

Bugatti
Buick
Cadillac
J. I. Case T. M. Co.
Chalmers
Chandler
Chicago Trucks
Cole
Commonwealth
Conestoga Trucks
Continental Motors
Crane-Simplex
Daniels
Davis Daniels
Davis
Deere Tractors
Delco-Light
Diamond T Trucks
Diehl Trucks
Dodge Brothers
Dort Dort
Duesenberg Motors
Eagle Tractors
Essex
Federal Trucks
Frontmobile

facturers use A
F-W-D Trucks
Gabriel Trucks
Genco Light
Gide
G. B. S. Motors
G. M. C. Trucks
Gramm-Bernstein
Trucks
Gray Dort
Hackett
Hall Trucks
Harfield
Haynes
Herschell-Spillman
Hispano-Suiza
Holt Tractors
Howell Tracto

AU Spark Plu

Kissel Kar
Kleiber Trucks
Klemm Trucks
Klemm Trucks
Knox Tractors
Koehler Trucks
La Crosse Tractors
Lalley-Light
Liberty
Liberty Aircraft
Motors
Locomobile
Maccar Trucks
Maibohm
Marmon
Marmon
Master Trucks
Maytag
McLaughlin
(Aughal)
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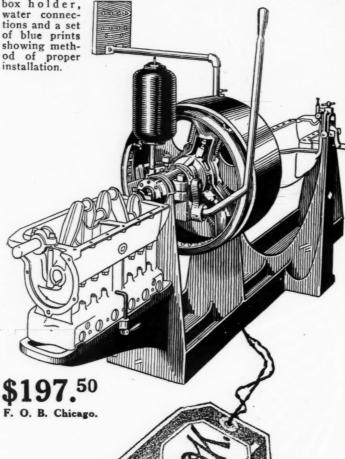
National
Nelson
Nelson Tractors
Nelson & Le Moon
Trucks
Neson & Le Moon
Trucks
Noble Trucks
Noble Trucks
Noble Trucks
Nothway
Oakland
Old Reliable Trucks
Oldsmobile
Owens Light &
Power Plants
Packard
Paige
Pan
Pan-American
Pan-American
Parker Trucks
Paterson
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Petrocks
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Petrocks
Phianna
Pierce-Arrow
Pilot
Piloneer Tractors
Premier
Ranger Trucks

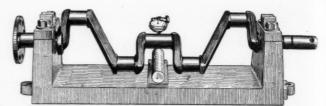
American Junior Combination Bearing Burning-In, Motor Test and Running-In Stand.

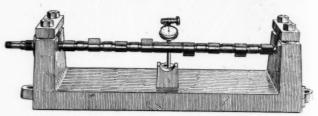
Saves 5 to 7 hours over the hand-scraping method in renewing a set of Ford Motor-bearings. Gives to bearings a 95% bearing surface.

line tank, coil box holder, water connections and a set

\$197.50 F.O.B. Chicago, including gaso-







Combination Alignment Machine for Crank Shafts and Cam Shafts. Price \$40.00

Fairbanks Equipment

Ford Service Stations

Some Service Stations are doing more work, giving better satisfaction and making more profits.

Why?

Because they are using Fairbanks laborsaving and profit-making machines and tools.

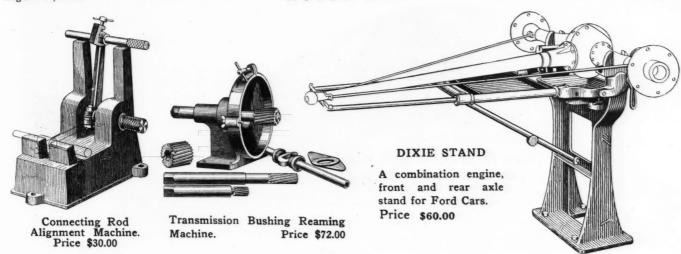
These machines and tools eliminate all unnecessary work and permit the mechanics to get at the parts to be repaired in surprisingly short time.

The

and other manufacturers of garage equipment.



MILL, MINE AND RAILWAY SUPPLIES, SCALES, VALVES, POWER TRANSMISSION, TRUCKS AND WHEELBARROWS MACHINE TOOLS, ENGINES AND PUMPS, AUTOMOBILE AND SERVICE STATION EQUIPMENT



Sold under "The Fairbanks Company O. K."

There is a piece of equipment for every need.

And remember all of these machines are guaranteed by "The Fairbanks Company O.K." This is your protection. Use it to its fullest value.

Write to the nearest Fairbanks Branch House for catalog illustrating and describing each tool listed on this page.

THE FAIRBANKS COMPANY

ADMINISTRATIVE OFFICES :- NEW YORK

BRANCH HOUSES

Albany
Baltimore
Birmingham
Boston
Bridgeport
Buffalo

Chicago Detroit Hartford Newars New Orleans New Pate Phila Pitts Prov

New York Paterson Philadelphia Pittsburgh Providence Rochester Scranton St. Louis Syracuse Utica Washington
Havana, Cuba
London, England
Birmingham, England
Glasgow, Scotland
Paris, France

Listed below are many other labor-saving and profit-making machines and tools which should interest every Ford Service Station owner. All of these machines and tools are sold under "The Fairbanks Company O.K."

Bearing Burning-in Machines for Ford and Fordson Motors Motor Test Stands Rear Axle Test Stands Axle Sleeve Pullers Turning Bars Bench Motor Clamps Piston Clamps Special Jacks and Trucks Cylinder Boring Machines Re-Babbitting Jigs Air Compressors Transmission Reaming Machines **Bushing Drivers** Rim Tools Pneumatic Valve Grinders Radiator Test Plugs Connecting Rod Alignment Machines "L" Wrenches Speed Wrenches Reamers Straightening Presses Arbor Presses Power Grinders

Tractor Tools and special machinery for Ford and Fordson

The FAIRBANKS

Sole Distributors for the SERVICE STATION EQUIPMENT CO. Company and other manufacturers of garage equipment.



MILL, MINE AND RAILWAY SUPPLIES. SCALES. VALVES, POWER TRANSMISSION, TRUCKS AND WHEELBARROWS MACHINE TOOLS, ENGINES AND PUMPS, AUTOMOBILE AND SERVICE STATION EQUIPMENT



Look for the Continental Red Sealthe mark of a dependable motor

When you see the Continental Red Seal on the motor of an automobile or truck, you know that here is a motor which has stood the test of service.

For more than sixteen years Continental engineers have been building motors. Today more than 165 successful manufacturers of passenger and commercial cars equip their output with these motors. The result is a motor that embodies the best engineering genius of all these builders—a motor built, not upon theory, but upon a definite record of experience.

of experience.

Hundreds of thousands of Continental Motors are today in constant use—giving sure satisfaction to their owners in power, speed, flexibility, economy, dependability.

Over 16,000 dealers today will recommend to you a motor car or truck equipped with the Red Seal Continental Motor—they know the value of a satisfied customer.

Look for the Red Seal—the mark of dependability—on the motor in the car or truck you buy.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Michigan

Factories: Detroit-Muskegon

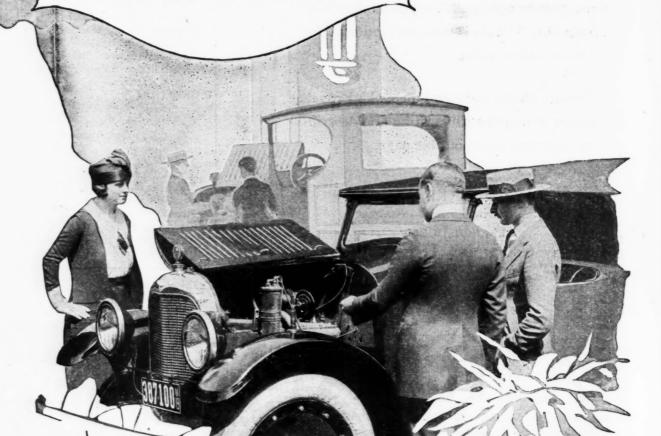
Largest Exclusive Motor Manufacturers in the World



America's Standard Passenger Car Mo-tor. Look for the Red Seal Nameplate.

America's Standaro Truck Motor. Lock for the Red Sest Nameplate.

STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS





DREADNAUGHT TIRES

THE DREADNAUGHT TIRE & RUBBER CO.
BALTIMORE, MD.

GUARANTEED 6000 MILES



CHARLES F. U. KELLY, Inc. sales department

1834 BROADWAY NEW YORK



In making our selection of the units for the MUTUAL we closed our ears to the noise of mere popular advertising; and, by careful comparison, measurement and test, of the rival makes of engines, clutches, transmissions, universals, frames, axles, radiators, steering gears, magnetos, carburetors, wheels and all other parts, chose the ones that the great majority of the best posted authorities on the "inside" agreed with us were the only ones that could be used for a truck that would dare call itself—"America's Greatest Truck."

MUTUAL SUPER SPECIFICATIONS (TWO TON)

America's Greatest Truck Engine

From every standpoint—design, material, construction, extreme care in manufacture and inspection, the *Wisconsin Engine* is recognized as indisputably America's Greatest Truck Engine.

There are several very good "second best" truck engines on the market, any one of which is good enough for an ordinary truck; but there is only one engine that is good enough for "America's Greatest Truck"—and that engine is the "Wisconsin"—first in gas economy, endurance, reliability and all-round engine efficiency.

And we put into our 2-ton MUTUALthe same 4 x 6 Wisconsin engine that others use in their 3 and 3½-ton trucks.

America's Greatest Truck Governor

The Duplex Company's Duplex (not Simplex) is the only one that controls road-speed independent of motor-speed. It makes the driver obey the owner's orders always and everywhere it is in fact an



everywhere; it is, in fact, an "automatic chauffeur," that adds years of life to the machine by guarding it against abuse. It is vastly more accurate than throttle control; makes a 20% increase in gasoline efficiency by use of a patented "grid" valve instead of the butterfly type. It proportions fuel-feed to suit road conditions, delivers power as needed, and insures a quick get-away. The Duplex delivers more power on hills and bad roads; increases average road speed 20-30% and acts as an automatic safety brake on steep down grades. Incidentally it costs us 2 to 5 times as much as other makes and types.

America's Greatest Truck Clutch

The Hele-Shaw, Universal No. 5, oil-immersed, multiple-disc clutch costs us twice as much as the next best, and from three to four times as much as clutches used on the majority of trucks. It gives a smooth, silent but

positive pick-up; a firm final grip; and saves the engine and entire mechanism (including tires) the ruinous "racking" that cheap clutches cause. You will tolerate no other clutch on any truck you own after you use the Hele-Shaw.



Greatest Truck" 2-31/2-5 TON

America's Greatest Truck Universal

Could it be anything but a Spicer? And we use three Spicer joints in the shaft and a fourth in the universal clutch itself. Here, too, we put into our 2-ton Mutual a size used for 3 and $3\frac{1}{2}$ -ton trucks by all other makers who use the Spicer.

America's Greatest Truck Transmission

"Fuller" of course; and their model "G5" selective; with removable plates, to permit attachment of mechanical hoist and tire pump. Four speeds forward and reverse. A simple sturdy, dependable gear-set used by leading high-priced truck makers on their 3 and 3½-ton models.



America's Greatest Truck Axles (Ball Bearing)

To insure the highest efficiency, we adopted the Sheldon Worm Gear Axle—first because both the worm thrust and radial loads are taken by ball bearings, which offer less friction than any other type of bearing. Second—because it is of the semi-floating type, which has the advantages of greater simplicity, less weight, greater carrying capacity, greater resistance to side shocks, lower maintenance cost and greater ease of removing wheels for



inspection. The more deeply versed in scientific automotive engineering a man is, the more emphatic will be his declaration that the Sheldon is America's Greatest Truck Axle.

Sheldon Ball bearing steering knuckle type of Front Axle was adopted as a matter of course.

And These. Too. Are Greatest:

Parish and Bingham pressed steel Frame; extra heavy type. Length 224 inches.

Mather Chrome Vanadium Springs.

Smith Metal Wheels for solid tires—regular equipment and not a costly extra.

Dayton Steel Wheels for pneumatic tires.

Goodyear or Firestone Tires; 36 x 4 solid for front wheels and 36 x 8 for rear; or same makes of Pneumatic tires as an option, at an extra cost.

Ross Steering Gear—with 20 inch wheel (not 17-18 inch).

Perfex Radiator, worth a big story in itself.

Bosch Magneto—type ZR4 with impulse-starter. Dust proof and water proof.

Stromberg Carburetor; type M.

Bound Brook Oilless Bushings: throughout.

Weather-tite Cab—fit for a King; regular equipment.

Powell Muffler-12 sections. Remarkably silent.

Electric Steel Castings at vital points, where others use Malleables.

25-Gallon Gasoline Tank

Special 2½-gallon Reserve Lubricating Oil Tank.

Wheel base—150 inch.

Specifications on the Mutual 3½-ton and 5-ton are equally "Great."

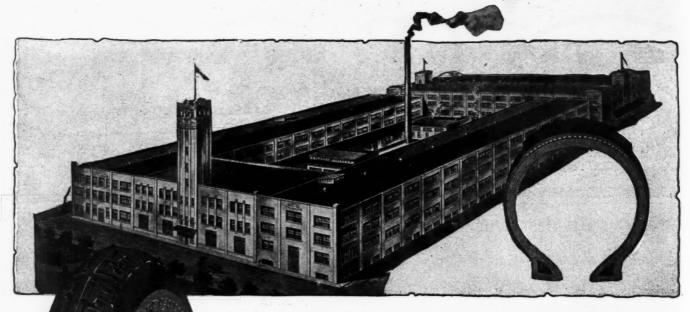
Dealer Territory Now Being Assigned

And we shall be as particular in choosing our local sales representatives as we were in selecting the parts that make the MUTUAL—

"America's Greatest Truck"

But, when we do find our man, we back him to the limit; and help him with a combined local and class journal advertising campaign that has no parallel in truckdom.

MUTUAL TRUCK COMPANY, SULLIVAN, INDIANA, U. S. A.



In calling attention to the calibre of the perfection tire organization we submit the following facts for the consideration of dealers and distributors.

PERFECTION - TIRES -

The factory of the well known Perfection Tire & Rubber Co., now under our universal marketing control, is located at Fort Madison, Iowa.

It is at present turning out over 1000 fabric tires daily, with ultimate production facilities for 11,800 daily. Demand which is now doubling that of last year will shortly call our entire equipment into activity.

Here is also a nucleus of 24 houses for some of the employees. This will shortly be increased to from 100 to 200 dwellings at a cost of \$5500 each.

For future extension 384 acres of land have been reserved.

In preparation for heavy cord tire production there are now being built machines with a capacity of 20 cord tires an hour. This volume will materially reduce cost of production.

Our large stock of Rubber and Fabric of unmistakable quality was purchased at very favorable prices.

Perfection Tires are Sold on an 8000 Mile Adjustment Basis.

This extraordinary service value is made possible and practical through the use of our exclusive Asbestos Breaker Strip, an extremely tough oversized tread and a carcass in which quality of material and careful workmanship leave no room for failure.

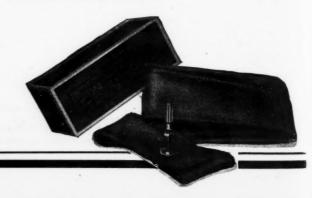
The responsibility of the Nemours Trading Corporation guarantees this well known tire as to performance and service. The sales plan is particularly attractive. Write us for particulars.

NEMOURS TRADING CORPORATION

General Sales Dept. for Perfection Tire & Rubber Co.

151 Fifth Avenue, New York

Guaranteed for 8000 Miles



Look for the Red Tag"

Advertisement Number Seven of a Series

"Imitation is NOT the Sincerest Flattery"

It is an effort to steal the other fellow's "thunder." The other fellow started the "thunder" and he deserves the business. Imitators trail along with inferior articles, spend no money for advertising, create no prestige and have but one desire: to build up, without expense to themselves, a business that does not rightfully belong to them. Is it fair to you that they should expect your help in putting this over?

Therefore, sell only GENUINE stewart Replacement parts

CAUTION

This tag is attached to all genuine

LOOK FOR IT!
If you don't find this tag, yo

If you don't find this tag, you are getting imitation substitute parts. Refuse to accept them.

Stewart Product, at our option invalidates the Stewart guarantee. For your own protection demand

Carline Siewart Fara.

Identifies the genuine. For your protection as well as your cus-

Look for the Red Tag"

This sign is FREE. Lithographed on metal, 14 x 20 in. Very effective.

We Sell Only
AUTHORIZED

Sleward

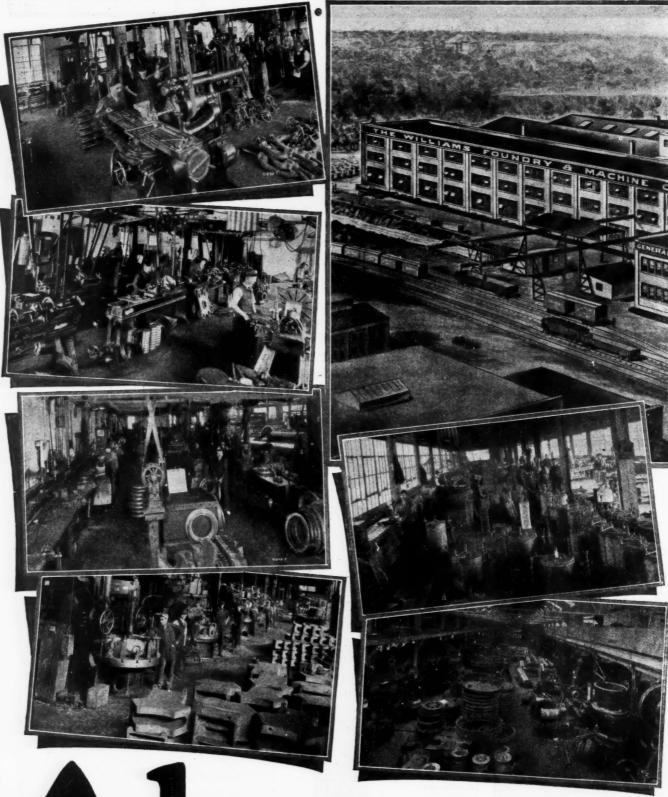
LOOK FOR THIS

RED TAG

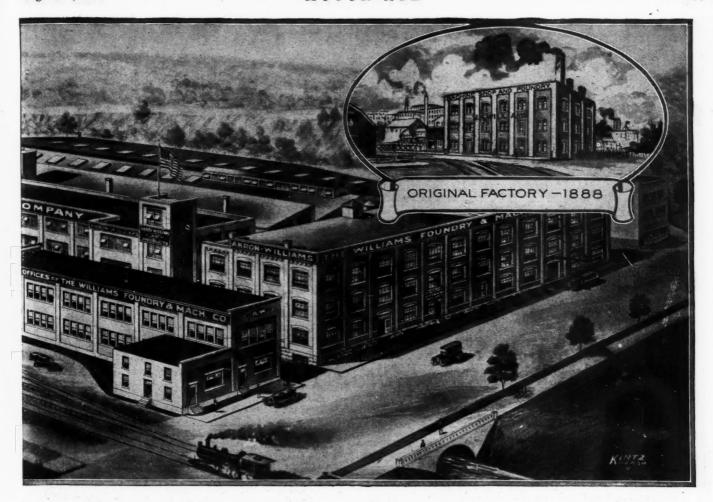
ATTACHED TO ALL GENUINE Stewart PARTS

Hang up this sign"

Stewart-Warner Speedometer Corporation-Chicago, U.S.A.



Akron-Tire repair



AKRON-WILLIAMS equipment is built with the experience founded on long years producing and perfecting tire-building and tire-repairing machinery.

Our facilities, capacity and improvements in tire engineering have kept pace with the growth and demands of the tire industry.

Our engineers have at their command the results of years of work equipping some of the largest tire factories in America and thousands of successful tire-repair plants. This wealth of information as to the correct arrangement and right choice of apparatus for economical operation, for the saving in time, labor and materials, is offered to you without charge.

If you contemplate re-modeling or increasing your facilities, tell us what you want to do and let us co-operate.

The Williams Foundry & Machine Co.

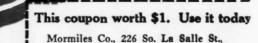
Everything in Tire-Repair Machinery and Tools

AKRON, OHIO

Williams
EQUIPMENT







Dept. 30, Chicago.

Enclosed find \$1 for one standard can of Mormiles and under your special introductory offer, please send me free, one standard can of radiator cement.

Name

Address

3:113

Trucks and Road Tractors

Sell the Truck Line which Thrives on Investigation

You cannot sell motor trucks while you are afraid of frank questions. Truck buyers are sure to ask questions-lots of them-and they ought to.

But you can sell trucks, with ever-increasing success, if you handle a line which thrives on investigation, which invites the closest scrutiny of the prospective purchaser and meets his expectations with high quality at every point. That is why you are certain of profitable business with

The New Koehler Line

All facts concerning the newly-improved Koehler trucks and road tractors, all their mechanical details and the history of their consistent development through many years of conscientious truck building, are clear and above board. The more questions there are asked about the new Koehlers, the better. No one wants to hide proven quality.

There is a great future for you in the truck market-with the right line. And we stand ready to prove that the new Koehler line is the right one—right as regards steady salability and right in all the factors which make and hold friends and build profitable sales.

There is an out-of-the-ordinary story of immediate interest to you in the new Koehler literature. We shall be glad to send it, and also our unusually liberal dealer offer, on request. Get your letter off today.

The H. J. Koehler Motors Corporation

Established 1895

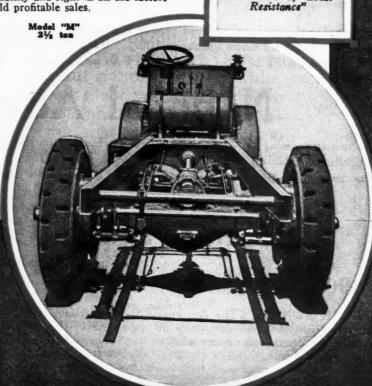
158 Ogden St., Newark, N. J.

The Koehler Line

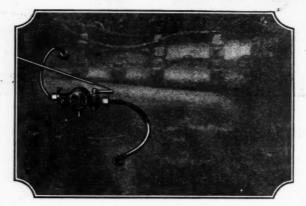
Model "K", 14-ton truck chassis, \$1450. Model "KT", 3-ton road tractor chassis, \$1535.

Model "M", 21/4-ton truck chassis, \$2965. Model "MT", 5-ton road tractor chassis, \$3050.

"The Line of Least Resistance"



50% PROFIT



The Automatic Steam Carburetor

Injects live steam into the intake manifold of combustion motors (automobile, truck, tractor, motor boat or aeroplane). Live steam prevents carbon from forming, keeps the manifold hot, increases vaporization and thus SAVES 25% TO 40% OF GASOLINE.

By keeping the motor free from carbon it eliminates motor repair bills, increases speed 5 to 7 miles per hour, and increases motor efficiency 100%. It is a PRACTICAL device that does what every automobile man knows MUST be done if fuel waste is to be stopped.

National Advertising

We are advertising the Automatic Steam Carburetor nationally, and co-operate with our dealers energetically to establish a market in short time. Write for our proposition. Do it today. Now is the time to get this profitable specialty—before a competitor beats you to it.

Automatic Steam Carburetor Co.

All Phones Belmont 7932

2490 Milwaukee Ave.

CHICAGO

TO CAR OWNERS! The Automatic Steam Carburetor is guaranteed to do everything claimed for it in this advertisement and you have 30 days' trial! If your dealer does not handle it, send your order to us direct. Mention the name of your car. We will ship you a Carburetor and offer to give your dealer credit for the sale.





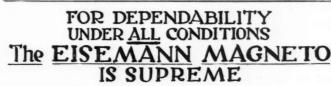
Holt Tractor at Pike's Peak , June 15-1919



SPLENDIDACHIEVEMENT

Standard Ordnance 5-ton Artillery Model Caterpillar Tractor-equipped with an Eisemann Waterproof Magneto-climbs to the summit of Pike's Peak-Altitude 14109 ft the last two miles thru drifts 15 feet deep

After a continuous run of 235 miles, it returned to Denver without a moment's trouble. Under most severe conditions the Magneto is the best ignition—Eisemann is the best Magneto.





Makers of Magnetos for all Types of Internal Combustion Engines

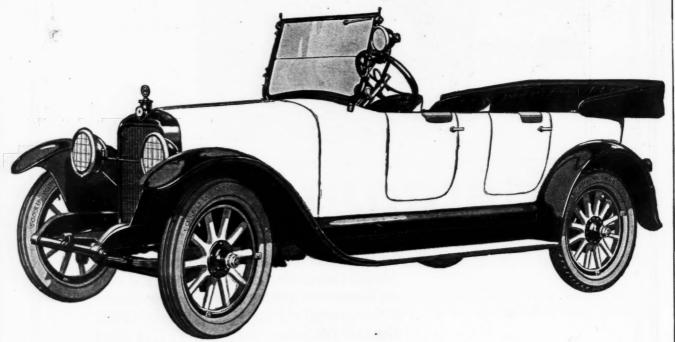
PLANT and GENERAL OFFICES-32 THIRTY-THIRD ST., BROOKLYN. N.Y.

CHICAGO-910 S.MICHIGANAVE - DETROIT 85 WILLIS AVE WEST.

LONDON, ENG. STANLEY J.WATSON SHEEN ROAD



Templar The Superfine Small Car



HE SUCCESS of the Templar is decisive.

It was obvious that many experienced owners desired The Superfine Small Car.

But when it became an accepted fact that the Templar fulfilled this exacting ideal, the demand far exceeded our optimistic expectations.

The car itself fulfills its promise of beauty, performance and durability expected of cars of the first rank.

It also fulfills its promise of low operating cost in economy it is not even approached by any other car of superfine quality.

Our entire output for the immediate future is required to fulfill existing contracts but we are glad to discuss future relation with Motor Car Merchants at any time.

The Templar Motors Corporation
3100 Halstead Street, Lakewood, Cleveland, Ohio

Templar Top-Valve Motor

Five Passenger Touring \$2485 Four Passenger Sportette \$2485 Two Pass. Touring Roadster \$2485 Five Passenger Sedan \$3285

Prices f. o. b. Cleveland

Poor Spark Plug Electrodes weaken the spark and reduce the motor's power.

Golden Giant Electrodes are made of pure nickel wire. These electrodes are high conductors of electricity. They throw a strong hot spark into the cylinder chamber, and ignite the gas with an explosion that develops full power out of the motor. They withstand the high heat and do not burn or corrode.

Materials of this sort have helped to make Golden Giant the high quality product that it is.

BENFORD'S GOLDEN GIANT

are being advertised extensively in many magazines. This campaign is costing thousands of dollars, and is giving Golden Giants national prominence. We have unusual sales helps that will aid the public to identify you with this advertising—that will bring its benefits directly to you.

Our window-trims, display-cards, size-charts, lantern slides and other sales helps are yours for the asking. Use them—they will help you to get behind Golden Giants and to increase your sales on the biggest money-making plug that you can buy.

The cabinet pictured here is free with one hundred plugs. Why not send us your first order for one hundred now?



Benford Auto Products, Inc.

Mt. Vernon, N. Y.



A set of barked knuckles will teach you more about a wrench than a course in mechanics:

A round shouldered nut you can't get a grip on will add to this knowledge more than a year in a factory.

That's the way you learn that one wrench slips and the other grips—that one nicks its sharp edges under pressure while the other holds true—that one wears out and the other endures. Yes, there is all that difference between such simple things as one wrench and another.

They may look somewhat alike. But the wrench that fits and holds and endures is marked up for you—with Triangle B.

Ask your mechanic. He knows all about Billings & Spencer wrenches, because to him good tools mean a good job.

He will tell you that they are hand-fitting, well balanced, sturdy—tools of tough (not brittle) steel—tools you can lean on and rely on, day in and year out—tools that will gain and deserve such friendship and respect as you accord to tried friends.

It has taken several thousand men fifty years to develop all that Triangle B of Billings & Spencer means. On a drop forging, a tool, or a forging machine, it says: "Rely on me. I am made as well as I can be made. I shall not fail."

And it started to say these things to the world of industry at the time of the Civil War.

The scleroscope tests hardness of steel by the rebound of a diamond tipped weight. Modern and scientific figures countenance no guessmore tests that the scientific figures counter
that the scienoscope tests that the scientific figures are scientific for the scientific figures are scientific for

The Billings Spencer Contact Hartford

The First Commercial Drop Forging Plant in America



THAT is the basis on which you can sell Harvey Springs. The car owner can trust them absolutely because they are built on such rigid standards that possibility of breakage in ordinary usage is simply out of the question.

Harvey Springs are specially designed for easy riding and great strength. They're boltless—no weak spots in them. And they're tempered exactly right, each leaf exactly the same by the patented Harvey process. Then too, they are put to the supreme Harvey test for strength—a test under such great force that no ordinary spring could endure it. That's why we guarantee Harvey springs against breakage or sagging. The margin of safety, the reserve strength, is so great that Harvey Springs live up to their guarantee even under emergencies.

Harvey Springs mean protection to the dealer—and more sales. Dealers are well supplied with sales helps, movie slides, window decalcomanias and inside wall posters as well as the helpful Harvey Spring Book.

There's a jobber near you who can supply you on short notice with any of the more than one thousand Harvey Springs. Write to us or to your jobber for the new Harvey Book.

Easy Riding

Guaranteed

Harvey Spring & Forging Co.
1008 17th Street Racine, Wis.

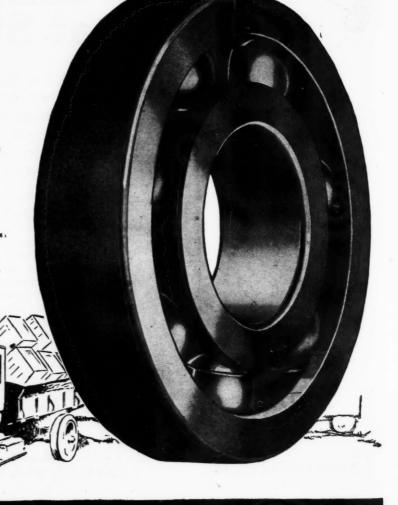


THAT high standard of quality which has always been represented by Strom Bearings and which has won for them such a wide-spread reputation for dependable service is, we are sure, the cause of the heavy demand now being made upon us for Strom equipment. Strom Bearings are now considered standard equipment wherever a shaft turns.

U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

Palmer Street and Kolmar Avenue, Chicago, Illinois



Strength to Resist

the hardest strains of riding and the commonest complaints of Motorists The Strength's in the Arch

The McAdoo Tunnels under the Hudson, built on the arch principle like Tuthill Titanic Springs, withstand the pressure of water outside and the vibration of heavy steel trains inside.



A Type for Every Passenger Car and Truck

WHERE ordinary springs are weakest, Tuthill Titanic Springs are strongest. The oldest principle of engineering—the arch—is employed to furnish that strength. No bolts, no holes, no nibs to weaken it. Nothing but the arch, properly reinforced by a yoke plate at the top and a yoke plate at the bottom, which holds the leaves in a vise-like grip. That's why Tuthill Titanic Springs are GUARAN' EED FOREVER

against breaks in the center—where nine out of ten springs break-and for one year against defective wear in any part. The majority of complaints about springs are occasioned by the very weakness that is eliminated in Tuthill Titanic Springs.

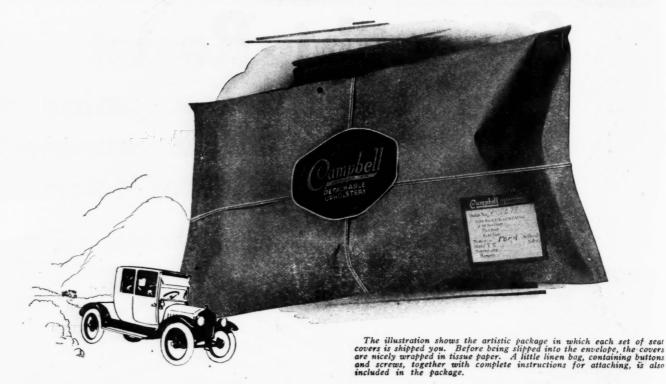
Send for Free Book

on springs—enables you to quote prices on Tuthill Titanic Springs for all makes of passenger cars and trucks—gives a complete list of Tuthill dealers. See Chilton's or Auto Trade Directories for complete list of dealers.

A handsome sign and spring-rack free for your show room under our special proposition







Have You Placed Your Order for These Ford Seat Covers?

Some time ago our buyers were able to secure for us material sufficient for the making of 40,000 sets of Campbell Detachable Upholstery for Ford Cars.

In view of conditions prevailing at the mills we considered ourselves highly fortunate in being able to obtain this supply.

Large numbers of these seat covers have already been asked for by dealers. Have you placed your order?

All of these covers are the usual Campbell quality—trim in cut, smooth in fit, attractive to look upon.

And the market for them is unlimited. They add brightness to old cars and style to new. Remember, when this stock of material is exhausted we will be unable to duplicate it. Wire or write now for prices and discounts.

The Perkins-Campbell Co.

625 Broadway

Cincinnati, Ohio

Campbell Radiator and Engine Covers.

Campbell Radiator and Engine Covers are three plyfirst an outer covering of high grade enameled duck, then a layer of asbestos and finally an inner lining of warm kersey blanket material or they can be furnished without the asbestos if desired.

One of the big selling points of these covers is their perfect fit. You can always tell Campbell Radiator and Engine Covers by their glove-like snugness.

The arrangement of the flap on front is an exclusive Campbell feature. During extreme weather it can be entirely closed. In more moderate weather it can be folded half way down.

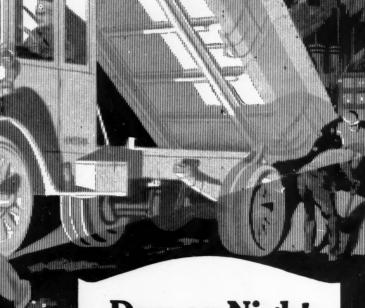
Campbell Radiator and Engine Covers can be had for every make of car.

Get in your order now. Have the jump on the dealer who waits until cold weather starts a demand. A postal brings you full particulars.









Day or Night

The 24 hour service range of Kissel Trucks meets today's unusual truck performance demand with made-to-your-business accuracy.

For instance—the Kissel "Freighter" is a masterpiece in the 2-ton field—with unique engine ability from its Kissel-built 4½" x 5½" motor—a more powerful motor than is found in the average 2-ton truck.

And every truck owner and driver knows that a truck must have surplus power to make good in this "neck of the woods."

There's a Kissel Truck for every line of business—including yours—

See our truck sales manager today.

KISSEL MOTOR CAR CO.

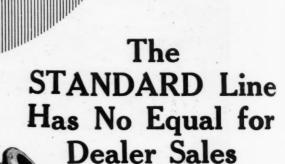
KISSELTRUCKS

Send

for it

TRADE

O



One of our dealers recently hit the nail squarely on the head when he said, "I've got to carry a line of stock that will sell the buyer as soon as he looks at it, in order to save time selling—a class of merchandise that will 'make good,' so there won't be any 'come-back'—and my stock must sell fast enough so I can turn my investment over every month."

This is exactly the type of dealer who insists on STANDARD Auto Jacks.

Nine out of every ten buyers will choose a STANDARD—and these sturdy jacks make good every time.

You can well afford to stock the STAND-ARD line—a complete line with a jack for every purpose. The profits are big and we will stand back of every sale you make.

ORDER FROM YOUR FAVORITE JOBBER

The National Standard Co.

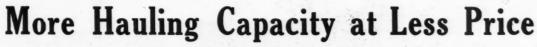
8th and Howard Sts.

Niles, Michigan

U. S. A.



With Internal Gear Drive \$1695 with Worm Drive



When a HUFFMAN dealer offers a prospect a HUFFMAN Truck he is selling him more hauling service per dollar than can be bought elsewhere. A truck of 2,000 to 5,500 lbs. hauling capacity, including body weight, built throughout as the HUFFMAN is built and sold at the price of \$1495 is an unusual buy for the truck owner. The wide range of HUFFMAN performance is a big selling point—speed and flexibility for light loads, power and strength for heavy loads.

The entire sales story of the HUFFMAN Truck is unusually interesting. Wire or write for details.

GENERAL SPECIFICATIONS

MOTOR—4 cyl. Continental—Red Seal.
IGNITION—Dixie High Tension Magneto.
CARBURETOR—Zenith.
CLUTCH—Fuller—Dry Disc Type.
TRANSMISSION—Fuller—Unit Power Plant Type.
STEERING GEAR—Lavine Irreversible.
FRAME—Hydraulic Pressed Steel Channel.
FRONT AXLE—Drop Forging with Timken Bearings.

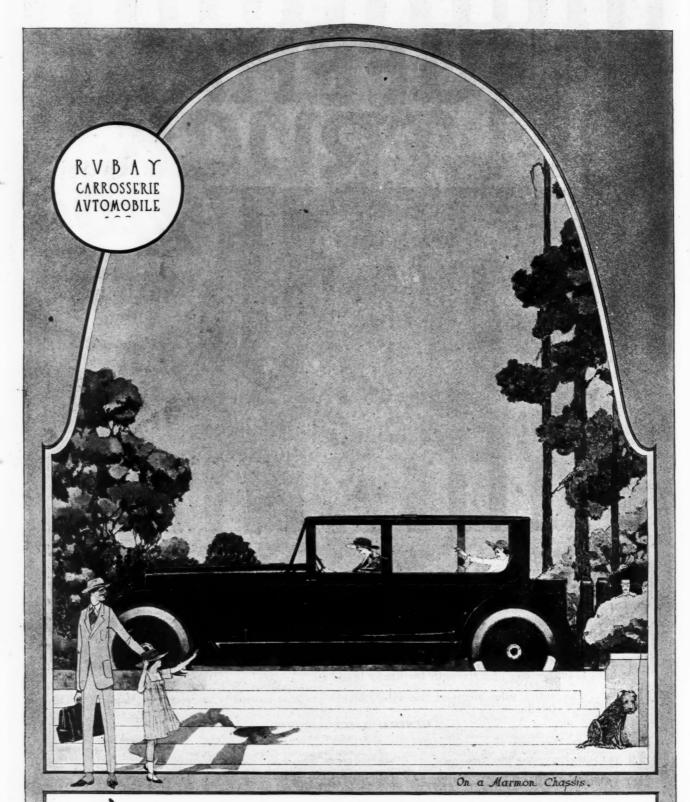
REAR AXLE—Torbensen Internal Gear or Standard Worm Drive.

Drive.
SPRINGS—Perfection—Special Design.
TIRES—Firestone.
WHEELBASE—140 inches.
LOADING SPACE—10½ ft. from rear of seat to end of frame. CHASSIS WEIGHT—3200 lbs.

If you are a truck dealer or would like to be a truck dealer, send for complete details.

HUFFMAN BROTHERS MOTOR COMPANY ELKHART, INDIANA MAIN OFFICE AND FACTORY,

BRANCH AND SHOWROOM-2425 MICHIGAN AVE., CHICAGO, ILL.

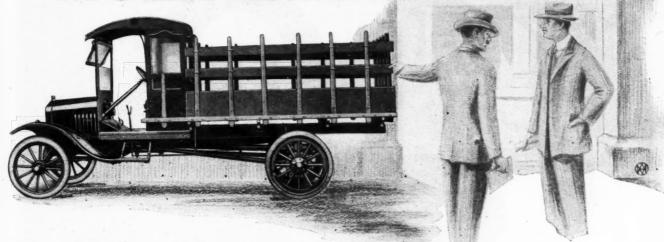


Custom-built body adds utmost style and comfort to the dependable performance of a well-built chassis. Send for our booklet showing the latest Rubay designs for both open and enclosed cars.

Rubay Company

Bodies That Last as Long as the Ford Chassis





Yes Sir! We Sell the Bodies That Go With the Chassis

ADVANTAGES OF THE MOLINE FIVE-POINT LINE

A Complete Line

There is a Moline Body for every need of every farm or business for delivery or hauling.

A High Grade Line

Moline Bodies are built as good as it is possible to build them, and they will last as long as the Ford chassis.

A Profitable Line

When once installed, there is no service to give.

A Business Building Line

Every buyer of a Moline Body is a satisfied user who will boost your business.

A Convenient Line

Quick delivery can be made from the nearest of our 23 branches, where a complete stock is carried.

Get the details of our dealer's proposition.

"It's one of the Moline high quality bodies and it will last as long as the chassis.

We have a complete line, one of which is ideally adapted to your specific requirements. We can deliver the chassis and body complete, ready for service."

Any Ford Dealer, with a Moline Body Department, can say this.

Simply add a Moline Body Department to your Ford Business, expand without increasing overhead, make more sales easier and quicker.

You get all the advantages of the well known Moline FIVE-POINT Line. Read them.

We have an interesting dealer's proposition. Write for it, also catalog, showing line.

MOLINE PLOW COMPANY

Office: Moline, Ill.

BODY WORKS

Factory: Freeport, Ill.

You can get quick delivery of Moline Bodies from the nearest of these 23 Moline Branches:

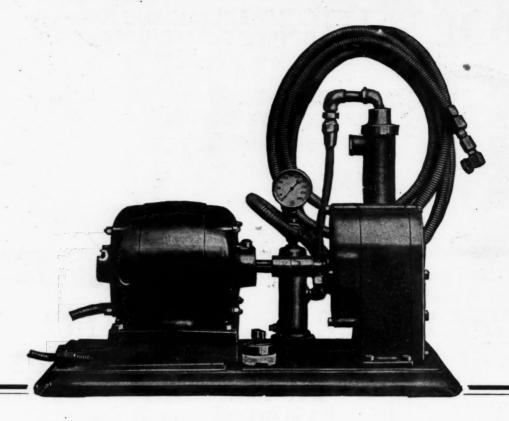
California Moline Plow Co., Stockton, Calif. California Moline Plow Co., Los Angeles, Calif. Colorado Moline Plow Co., Denver, Colo. Dakota Moline Plow Co., Sioux Falls, S. Dak. Illinois Moline Plow Co., Bloomington, Ill. Eastern Moline Plow Co., Baltimore, Md. Indiana Moline Plow Co., Indianapolis, Ind. Iowa Moline Plow Co., Des Moines, Iowa.

Kansas Moline Plow Co., Kansas City, Mo. Michigan Moline Plow Co., Jackson, Mich. Missouri Moline Plow Co., St. Louis, Mo. Minnesota Moline Plow Co., Minneapolis. Moline Plow Co., Moline, Ill. Nebraska Moline Plow Co., Omaha, Neb. Northern Moline Plow Co., Minot, N. Dak. New York Moline Plow Co., Poughkeepsie, N. Y.

Ohio Moline Plow Co., Columbus, Ohio.
Oregon Moline Plow Co., Spokane, Wash.
Oregon Moline Plow Co., Portland, Ore.
Oklahoma Moline Plow Co., Oklahoma City.
Seuthern Moline Plow Co., Atlanta, Ga.
Louisiana Moline Plow Co., New Orleans, La.
Texas Moline Plow Co., Dallas, Texas.
Western Moline Plow Co., Salt Lake City, U.

ADD A MOLINE BODY DEPARTMENT TO YOUR FORD BUSINESS

The "LongStroke" Compressor



The Cost of This Twice-as-Quick Air Compressor Is the Same as Slower, Less Powerful Pumps

—And It Means Something to Inflate Tires in Half the Time

In saving your customer's time, you save your own. This is the double-barrelled advantage of using the Longstroke Compressor.

This powerful compressor with the long 6-inch stroke and the next-to-nothing cylinder head clearance, works at a speed that has never before been attained by a tire pump. Not that it consumes any more current than others—for it doesn't—but its unique valve arrangement enables the piston to rise flush with the top of the cylinder on every up stroke, thus completely filling the space within the cylinder with air on every down stroke.

It pumps a 30 x 3 tire from flat to 60 lbs. in 28 seconds. A 34 x 4 tire from flat to 80 lbs. in 90 sec-

onds. A 35 x 5 tire from flat to 90 lbs. in 145 seconds. What pump can duplicate that?

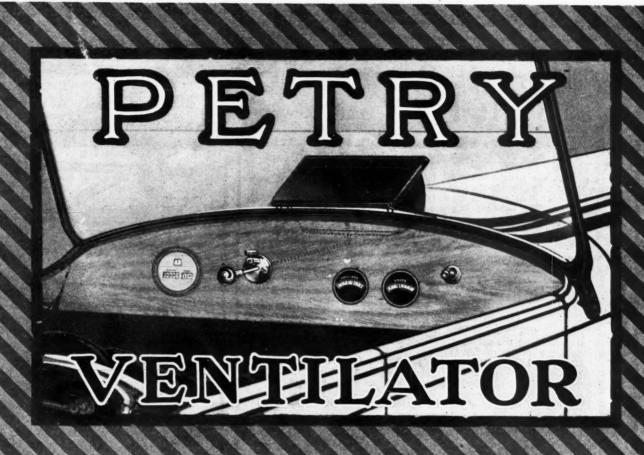
Its design—simple, efficient, and as nearly fool-proof as an electric compressor can be. Its construction—sturdy, compact, finely built; a perfect piece of workmanship. Materials—the very highest grade.

The price—you'd expect it to be higher than other pumps. But it isn't. It's the same as you'd have to pay for weaker, slower going compressors.

Hence, it is a real economic necessity in every progressive garage. There are numerous styles and sizes to choose from. Send for descriptive literature. Special territorial proposition for jobbers and distributors; write for details.

The MOTOR-COMPRESSOR CO.

Makers of Starting Devices and 2-Stage Compressors
52-60 DICKERSON ST., NEWARK, N.J.



THE PETRY VENTILATOR thoroughly ventilates the driver's compartment and especially that usually over-heated place—the floor up underneath the cowl. A specially designed adjustable baffle plate throws the inrushing air to any desired point. This is a unique feature not found in any other ventilator and increases the volume of air passing thru the ventilator to an extraordinary extent. Cool, fresh air is literally "scooped up" from in front of the windshield and thrown at the driver's feet.

Opening and closing of Petry ventilator is controlled by knob on instrument dashboard.

The method of application is entirely new, easily done and when finished a mechanically correct job. The base of ventilator is bolted thru the cowl to a sub-base, making a permanent clamp and holding the edges of cowl in rigid, dust and waterproof grasp.

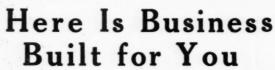
The Petry Ventilator is handsomely designed, its application adds materially to the snappy appearance of any car. The ventilator itself has a beautiful lacquered finish equal to that on the highest priced cars. Knob and dashplate, for instrument board, are solid brass heavily nickel-plated and polished. Special type for Fords, \$3.00. A universal type that fits any shaped cowl sells for \$5.00 complete, including installation tool.

Made by the manufacturer of the Petry Cut-out and Petry Universal Pedal.

N. A. Petry Company, Inc.

1309 Race St., Philadelphia

DISTRIBUTORS: { Gray-Heath Co., 1440 Michigan Ave., Chicago, Ill. Norman Cowan Co., 445-51 Rialto Bldg., San Francisco, Cal. J. W. VanDeGrift, 627 Charles Bldg., Denver, Colo.



The story of this regular man's-size pump, that puts pounds of air into a tire with ounces of effort, is being told to millions of people through the columns of the Saturday Evening Post.

You can use an ounce of sales effort and get a pound of profit by keeping the Coe-Stapley Whirlwind Tire Pump in stock. Car owners all over the country know of its merits. The business has been built for you. Every

Whirlwind Tire Pump

THE PUMP THAT OILS ITSELF

you sell will sell another. Every customer will tell his friends about the patented device that automatically lubricates the leather suction "buckets" which keeps them from shrinking, and assures a quick, plentiful delivery of air. There are many good merchandising points in this super tire pump which make it easy to sell, such as an extra heavy barrel, gray enamel baked, with a solid brass nickel top. Then there is a positive acting ball stop valve, an oversized handle and a heavy base. The Whirlwind Tire Pump retails for \$3.50. If your jobber cannot supply

\$3.50. If your jobber cannot supply you, write direct.

Coe-Stapley Manufacturing Corporation

Factories—Bridgeport, Conn. Sales Offices—136 Liberty Street New York City



is as easy to sell as the pump. It has received the esame publicity. You don't have to crawl around in the mud to place it. A demonstration sells one tor \$6.30 at a good profit. Order a dozen.

DO YOU get full measure of Gasoline Mr Ford Owner

JOHN D. DEMANDS FULL MEASURE OF GASOLINE

Portsmouth, N. H., July 18.-[Special.]-John D. Rockefeller questioned the accuracy of a gasoline filling machine and the proprietor of a garage measured a sample gallon at his request, it became known here today, following the departure of Mr. Rockefeller and party for Tarrytown, N. Y.

When the four automobiles reached the motor) mart last night Mr. Rockefeller ordered five gallons put into the tank of each. He watched the filling process, then summoned Mrs. R. C. Dickey, proprietress of the garage, and said:

"Madam, are you sure your pump delivers a full gallon to the stroke?"

"Absolutely," replied Mrs. Dickey.

"It does not look so to me," insisted Mr. Rockefeller. "Would you mind having it tested for me?"

"Not in the least," responded Mrs. Dickey, and, summoning a helper with a sealed measure, she directed him to measure the gallon delivered at each stroke of the pump. Mr. Rockefeller gave close attention, and noted that the pump delivered an exact gallon at each stroke. He smiled as he said:

"It's the first pump I've seen which is accurate for several days. Thank

E_CONFIRMS

INSURES

And this Infallible Gauge does more than check overcharge for gasoline:

—It checks your Gasoline-Mileage.

-Checks performance of your engine.
-Tells you, instantly and always, how much "Gas" you have in your tank to run on to where you want to go. Only pay attention to the dial—in plain sight alongside filling-hole of your gasoline tank—and never again need you stall on the road with an empty tank, and

then hike weary miles to get a quart or so. This Sure and Certain Fuel-Meter is unique in its absolute accuracy.

—Unique in being graduated to contour of cylindrical tank (NOT merely to depth).

-Installed in a moment; good for years of service. -Fits into filling-hole; never need be re-

moved. If your dealer is not a STANDEX DEALER, send us his name with your order, and Gauge will be shipped prepaid.

Try it 30 days. If it is not absolutely satisfactory, return it.





ALL GUESSWORK

Standex Automatic Lubricating System Solves Your Biggest Problem

Assures Certainty instead of Guesswork—Cleanliness instead of Mussiness—Power instead of Inefficiency—Economy instead of Waste.

Prevents Carbonized Cylinders, Fouled Spark Plugs, Smoke, Overheating.

Gives a Traveling Range of 800 to 1,000 miles, without a worry, on Single Filling of Reservoir.

STANDEX DISTRIBUTORS EVERYWHERE are making money representing us.

They are supported by Standex Quality, reinforced by the Standex Guaranty, and backed up by Standex National Advertising.

YOU WILL FIND IT DISTINCTLY TO YOUR ADVANTAGE to write at once for our proposition to Distributors.

"Solve the problems of Lubrication, and you have solved seventy-five per cent of the difficulties you may have with motor cars." "FORD TIMES," May, 1915

Standex Manufacturing 341-345 E.OHIO ST., CHICAGO

wrenis or use on deau street for use on deau athe.

Knurled upper-sleeve. Handy in starting to tap, giving firm hold in starting action gently. Solidary constructed yet without usely a starting action and the starting action action and the starting action a

weight. Sold yet without useless Morable cross bar adjustable to my position so that corner work secomes as accessible as though a the open. Hidden here under the lower leeve are the gear and pinion hat afford the advantages of the accessible yet avoid 'ts hortcomings. Skurded lower sleeve with bextra long better with the strain of the

teomings.
Knurled lower sleere with extra long bearing. This covers the body and at its base, the souare jawed chuck shown in No. 6.

Square broached jaws to insure firm grip and true chucking of the tap.

Takes the Corners Out of Close Quarters

AKESHIFT tools discourage efficiency. How often do you fuss, fret and fume with pliers, socket wrench and other haphazard tools over a seemingly simple tapping or reaming job in some corner or other inaccessible place where the cross bar interferes with the revolving wrench? Done with Alert Ratchet and High Speed Tap Wrenches, the time saved on one such job pays for one of these efficient tools.

The Alert Ratchet Tap Wrench (Patented) remains rigid as a solid tool for tapping. It is instantly convertible into a right and left turning tool. A slight pressure upward on the cross bar with the thumb rest to help engages the pinion and internal gear arrangement that makes possible this quick change. Remove the pressure and the wrench becomes a solid tool. No inconvenient pin or pawl adjustment. With its adjustable cross bar handle in end position the Alert Ratchet Tap Wrench may be then used where obstructions would not permit the free swing of a solid "T" handle.

Alert High Speed long length Tap Wrenches (solid) take Alert High Speed long length 1ap wrenches (solid) take the corners out of close quarters, permitting work in the open without the usual cramped, back-straining positions of body. Style X may be locked with another Alert High Speed Tap Wrench (as pictured, forming a 26 inch length) or with an Alert Ratchet Tap Wrench. This long grip saves the expense of extra long taps; reduces tap breakage and eliminates makeshifts.

Other Alert tool specialties are Roller Grip Mandrels (six types) for quick second operation work; Boring and Facing tools for facing, radiusing, boring and counterboring where the cost of large drills is prohibitive; Hand Knurling Tool, adjustable for knurling pieces of different diameters and

Alert tools make for greater all-around efficiency. Made of finest material, of sturdy construction and handsome finish, the Alert line wins respect from all good mechanics. Write for complete catalog and prices.

JOBBERS: Some excellent territory open under a pro-tective sales policy that includes excellent helps and assures good profits.

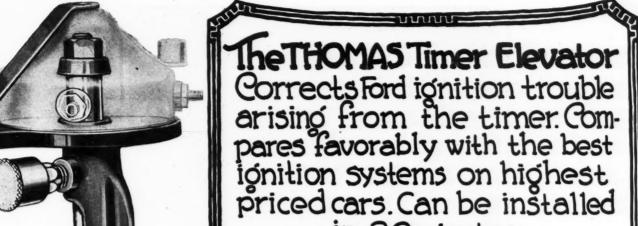
ALERT TOOL CO., Toolmakers' Specialties 237-39-41 North Sixth Street, Philadelphia, Pa.





Price

\$6.50



in 20minutes
The Thomas Timer Elevator

The Thomas Timer Elevator entirely corrects all ignition troubles on Ford cars arising from the timer. Easily installed on a Ford motor, this elevator provides an ignition system which is comparable to the ignition systems used on the best cars built.

The wiring is overhead—where it should be. The timer is raised where it is completely protected from grease, mud and water—where it belongs—and can be installed in 20 minutes.

Any Timer made to fit a Ford will fit the Thomas Timer Elevator without making any changes.

The Thomas Timer

The Thomas Timer is a strictly wipe contact timer based on principles which have been used successfully in the electrical field for years. In the Thomas Timer there is a "minimum of motion" and a "maximum of accuracy." The wipe contact principle permits making contact at the right time and produces four perfectly balanced explosions. An outstanding feature of the Thomas Timer is the fact that it has very few moving parts and any worn part can be replaced at small expense in a few minutes. The Thomas Timer is guaranteed unconditionally for one year from date of purchase.

THOMAS PRODUCTS ARE SOLD THROUGH JOBBERS

Each timer is packed in a separate carton and one dozen timers are packed in a large carton. Thomas Timers have made a strong appeal. Efficiency of construction at the right price has made them foremost among timers for Ford cars.

Jobbers—Write for full details. Dealers—Order from your jobber.



THOMAS TIMER \$1.50

THOMAS-ANDREWS CORPORATION, CHICAGO

THOMAS

TIMER

ELEVA-

TOR

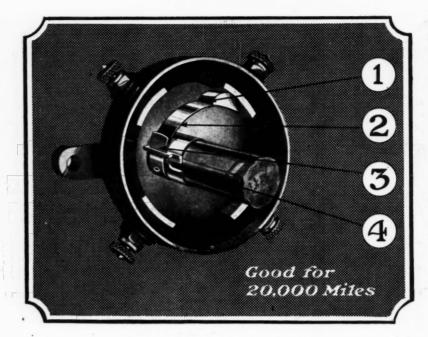
Department of Sales

624 S. Michigan Ave. Factory, Waukegan, Ill.

Chicago. Ill.

Note how the elevator lifts the timer out of trouble.

Mumic



Rounded contact, brush of wear proof hardened steel, insures positive sliding contact with never-a-miss.

2. Swedish steel spring insures an even tension contact at all speeds, and under all conditions of service.

3. Cushion Spring — acts as a shock absorber for the brush and absolutely prevents "jumping" or breakage in the event of backfire.

4. Easy fitting Brush coupling. Fits any standard Ford Timer Shaft and permits use of MILLER "NEVER-MISS" Brush with any standard make of Timer.

A Common Sense Solution of the Ford Timer Problem

Y OUR regular Ford Timer has a rolling brush: a strange contrivance that robs the timer of about 60% of its life and efficiency. It works like a miniature triphammer, pounding ridges into the contact bed, packing an insulating mass of dirt and grease onto the shoes, and setting the stage for misfires and balky engine performance. Have you ever examined your timer after two or three thousand miles of service? Try it—if you can stand the horrible sight.

The inventor of the new "MILLER NEVER-MISS TIMER" did a sensible thing when he discarded the old battering, mischievous, trouble-making roller, and devised a sliding contact brush to take its place.

And this big little idea means just about FIVE HUNDRED PER

CENT MORE TIMER MILEAGE for Ford owners. It means the end of misfires, wasted gas, oil-soaked spark plugs. It means a smooth, even, clean contact surface-a hot, perfect spark four times around without fail. Never a rough spot; the longer you drive, the smoother your timer.

The MILLER "Never-Miss" should give 18,000 miles of perfect service without changing the brush.

The Miller Brush, which makes possible the remarkable efficiency of the Miller Timer, can be purchased separately for use with any standard make of Timer. Even though the contact ring of your present timer is in bad shape the Miller "Never-Miss" Brush will wear it smooth again after about 500 miles of service.

List price of Brush only-80 cents.

actual record is over 25,000. When it's gone the limit - worn out - you can get a new brush for 80c; and thousands of miles more. Fits all Fordson Tractors, as well as Ford Cars and Trucks.

The complete timer, ready to install. costs \$2.00-a trifling investment that pays a huge dividend.

Take a two-dollar bill to your dealer and say "MILLER Never-Miss." It's the cheapest price you ever paid for timer life-insurance—a little sum that frees you forever from firing troubles. If your dealer can't supply you, order direct from us; your MILLER will be sent, prepaid.

Mil - Mac Manufacturing Co. 1714 N. Broad St., Philadelphia, Pa.

DEALERS

This quick-selling, customer-satisfying timer should have a prominent place on your shelves. It pays good money and makes good friends. Write to your jobber, or to us.

Miller Never Miss 1

Good for 20,000 Miles Sliding Contact Principle



"Note the simple little put that balances all wear on the only moving part of the Taber Combined Muffler and

Taber Combined Muffler and Cut-Out. It keeps the Taber Cut-Out Valve absolutely gas tight. It is only one of a score of exclusive features that distinguish the Taber as the only device of its kind on the market. This wonderfully ingenious invention makes for comfortable motoring at less cost.

Regular models for FORDS, CHEVROLETS and MAX-WELLS.

Models for BUICK and DODGE to be announced soon.



DEALERS

We offer you wide-awake co-operation. Wire a trial order today to prove how easy it is to sell the Taber. Please mention the Jobber with whom you brefer to do business.

Makes New Cars Better Brings Old Cars Back to Life!

Back pressure is the nightmare of motoring
It adds a luxury tax of its own to the cost of
motoring. It is the thief of pleasure—of gasoline
—of power needed to make hills. Ordinary mufflers
call for the help of cut-outs. The misfit muffler and cut-out
have hindered rather than helped solve the problem.

A Wonderful New Invention

The ideal combination of Muffler and Cut-Out was unknown until the advent of the Taber. With the introduction of the Taber for the Ford, followed closely by the Taber model for the Chevrolet, thousands of car owners already appreciate what a difference in car performance the Taber has accomplished.

Reduces Back Pressure— Eliminates Carbon

By giving free passage to the explosive gases with least possible resistance the Taber gives instant relief from back pressure, frees the engine of carbon, keeps the motor running sweet and clean and delivers greater mileage per gallon of gasoline. The Taber Patented Port Valve Cut-Out is SELF-CLEANING—it cannot become clogged.

Simple Design — Sturdy Construction

'he Taber requires no attention, readjustment r upkeep. It is as simple as it is efficient. iecause of its solid construction it can't work oose, rattle or blow out. It is always ready, responsive, dependable and lasts the life of the car. It is mechanically right.

No Expense to Attach
With each Taber comes full and simple instruction for quick and easy attaching

LIST PRICE,

Ford Type, \$4.85

Chevrolet and Maxwell Type, \$5.50

JOBBERS

If any of you have been overlooked by our Salesmen, don't feel offended. Our District Sales Managers are trying to see you all. If you are a legitimate jobber of automotive equipment write or wire us at once. Quick action will pay quick dividends.

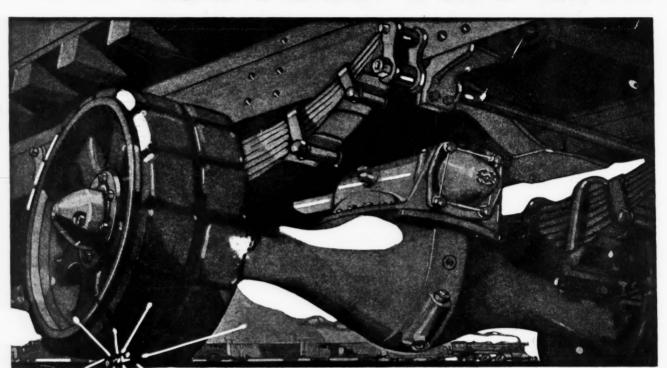
EMCO MANUFACTURING CO., Inc.

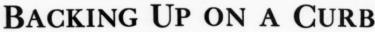
Makers of Dependable Products for the Automobile

42 Court Street, Binghamton, N. Y.

MUFFLER CUTOUT

leloon FOR MOTOR RUCKS







for Look for this Sheldon trademark cast on the hous-ing at the rear end of the worm gear. It identifies a Sheldon Axle and is your assurance of strength, long life, safety, and econ-omy of upkeep.

REMENDOUS side strain is put on an axle when backing up on curbs, turning corners, or going over uneven or rutty roads.

Railroad axles which carry heavy loads and take curves at high speed are subjected to even greater side strains.

Sheldon Worm Gear Axles are built on the Locomotive Axle principle to give strength for side strains.

This is done by fixing the wheels to the revolving, load-carrying, live axle with bearings widely separated to give maximum leverage.

This is Sheldon Construction—the same principle that is employed in Locomotive and Freight Car Axles, which carry the Freight Tonnage of the World.

Another severe strain on an axle is the pressure on the thrust bearing.

In a Sheldon Worm Gear Axle the thrust is taken by a ball bearing, which takes the maximum thrust without wedging. All the pressure is taken at the center of the balls, so there is no tendency to push them to the side and thereby increase friction.

Truck buyers should consider that the axle is the most expensive unit in a truck and really represents the life of the truck.

Sheldon Worm Gear Axles are built on the Locomotive Axle Principle. Let this fact be an important factor in the selection of a truck.

Sheldon Superiorities explained in a booklet sent free

Sheldon Axle & Spring Company, Wilkes-Barre, Pa.

Manufacturers of Sheldon Axles for Motor Trucks and Sheldon Springs for Trucks and Automobiles

This is a reproduction of an advertisement appearing in the Saturday Evening Post and other leading Publications.

Book and the second

"WEAK TIRES"

without

Don't

Don't

DON'T

Throw Away

Your Old Tires

FINISH - THIS - SEASON

USE MAXOTIRES

K&W RUBBER COMPANY

RELIABLE—ESTABLISHED

54-60 Channing Street DELAWARE, OHIO



"Why I Sell Sterling Plugs"

"I sell Sterling Spark Plugs for the same reason that I use them in my own car.

"I know from my own experience as well as that of my customers, that Sterling Plugs give the kind of service that makes customers stick. Once in a car, you need never think of them except to occasionally wipe off the carbon—and that is a matter of only a few minutes. Anyone can clean a Sterling by merely unscrewing its bushing.

"Note the size and quality of Sterling electrodes. They are heat proof and shock proof. Practically no amount of firing will cause them to burn or bend from their original positions. The center electrode is made from high grade nickel alloy Monel metal, the most expensive material of its kind on the market.

"Sterling electrodes have a strength not found in ordinary spark plugs. They are built to last—to give an even, steady spark at all speeds and in any motor. Just look at the size of Sterling electrodes, then compare them with others."

Sterling Spark Plugs are sold by progressive garages and supply dealers everywhere.

THE LOCKWOOD-ASH MOTOR COMPANY
1956 MAIN STREET JACKSON, MICHIGAN

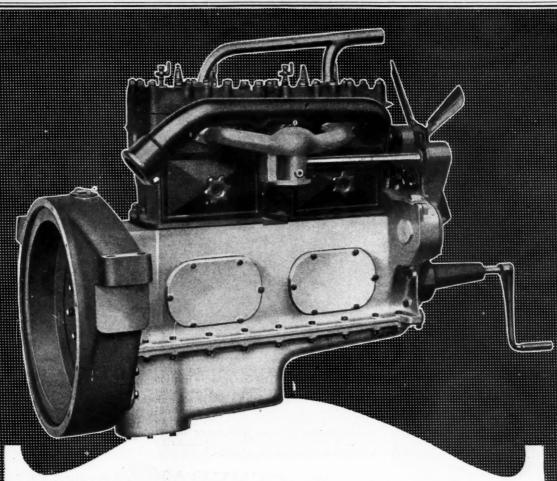


(62)

SEPARABLE



CLEANABLE

A style and size for every car 

TO more adequately meet the demand for a full range of motor sizes, two particularly desirable new models, a $4\frac{1}{2} \times 6\frac{1}{4}$ and a $5\times 6\frac{1}{4}$, have been added to the line of



High Torque Motors for Trucks and Tractors

These two models embody all the characteristics of design that have won for Waukesha Motors an exceptional record of economy and dependable performance under every condition of service.

Descriptive circulars of new models will be mailed upon request

WAUKESHA MOTOR CO.

WAUKESHA, WIS.

World's Largest Builders of Truck and Tractor Motors Exclusively





1 The Lightning Cut

2 Oil Distributing Groove Right: shows shape of oil roove. Note scraping edge.

lottom: shows upward

ourse of oil groove.

Some rings are oil gushers. Others are bone dry. The former waste oil and cause carbon. The latter cause friction and wear. Between these two evils no one need choose. Lightning Cut Rings offer an alternative. With an oil groove that wanders up and around the ring, carrying oil to points on the cylinder wall never before reached, normal friction between piston ring and cylinder becomes negligible.

This oil distribution is controlled. On the down stroke the right angular edge of this notched oil groove effectually scrapes away all excess oil and returns it to the crank case through the inclined groove. This oil is made to do its duty. It does it without waste. Without friction. Without wear.

GENERAL LIGHTNING CUT

Compression is as effectually controlled. The Lightning Cut does that. When expansion forces the horizontal cut, the diagonal cut edges lock with their opposite walls. The Lightning cut is a scientific combination of the old diagonal and step cuts.

the old diagonal and step cuts.

Individual casting produces the fine texture, the evenness of tensile strength and uniform expansion that distinguishes Lightning Cut Rings from the pot casted, sliced kind.

Full concentric design prevents cylinder wall wear due to unequal ring pressure and eliminates oil pocket carbon.

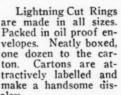
One piece construction gives unit expansion—unit strength—unit simplicity.

Your trade will appreciate Lightning Cut Rings. You will profit by telling how the

Lightning Cut Rings are made in all sizes. Packed in oil proof envelopes. Neatly boxed, one dozen to the car-Cartons are attractively labelled and make a handsome dis-

extra power they create gives greater mileage. How they save gas and oil. How they reduce friction and wear.

Just how you will profit is made clear in our wonderful new profit sharing plan that is revolutionizing the sale of piston rings. Write, wire or order today.





UTILITIES SALES CORPORATION

Sales Representatives
GENERAL UTILITY COMPANY
Factory 1324 Ogden St. Philadelphia-Office 809 New Stock Exchange Bldg., Philadelphia

Utilities that Sell Because They Serve

HOLT





In the past four years American tractor dealers have sacrificed considerable profit because the "Caterpillar" was exclusively engaged in war work.

That profit you can now regain.

The work of the "Caterpillar" in war is so familiar to American farmers and its proven capacity for work so much appreciated by them that a great and growing demand exists for the machine that turned out to be one of the most dependable pieces of Army equipment. The 5 and 10-Ton tractors we are selling today are exact duplicates of the machines used in war work.

A contract to sell "Caterpillars" will not interfere in any way with your contract for the sale of any good small tractor. The "Caterpillar" simply completes your line, giving you a tractor to sell to farmers whose work no other machine can do—a tractor on which you make a real profit.

Write at once for contract and terms. The public is waiting—we know that because so many inquiries are coming to us direct and so many sales are being made by dealers and distributors who have "Caterpillar" contracts.

the HOLT Manufacturing Co., Inc.
There is but one "CAUTHUAR"-HOLT builds it.

Peoria, Illinois

Factories, Peoria, Ill. and Stockton, Cal.

Branches and Distributors

Atlanta, Ga. Fargo, N. D. Kansas City, Mo. Los Angeles, Cal

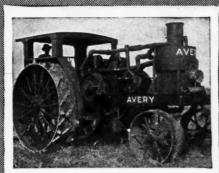
Memphis, Tenn. New York, N. Y. Omaha, Nebr. San Francisco, Cal.

Spokane, Wash. Wichita, Kans. Calgary, Alberta London, F. C.





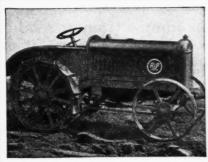
ractor Equipment



Avery Tractor



Russell Tractor



R. & P. Tractor

For Power and **Endurance**

LL over the world Bennett Equipped tractors are setting records for power and sturdy, long-lived endurance. Study the list. It includes practically every tractor manufacturer.

The life of a tractor depends upon keeping dust and dirt out of it. The Bennett Carburetor Air Cleaner removes these abrasives before they enter the carburetor. It prevents the formation of carbon and the cutting out of bearings, pistons and piston rings.

The Bennett Kerosene Carburetor secures the maximum efficiency ever obtained from kerosene. It is the special kerosene carburetor which supplies the exact conditions demanded by this fuel.

Insist upon Bennett Equipment.

WILCOX-BENNETT CARBURETOR **COMPANY**

Specialists in Kerosene Carburetors MINNEAPOLIS MINNESOTA Study This List of Tractor Manu. facturers Specifying Bennett Equipment

Allis-Chalmers Mfg. Co.
Amer.Eng.&Trac.Co.
Appleton Mfg. Co.
Aulson Tractor Co.
Aultman-Taylor Jo.
Automotive Corp. Avery Company Baker Tractor Co. Beltrail Aractor Co.

Besser Mg. Co.
Besser Mg. Co.
Best, C. L., Co.
BethlehemMotorsCo.
Blumberg Motor
Mfg. Co.
Boring Tractor Co.
Buckeye Mfg. Co.
Buckeye Mfg. Co.
Buckeye Mfg. Co.
Buckeye Traction
Ditcher Co.
Buckeye Tractor Co.
Bushock Tractor Co.
Coleman Trac. Corp.
Columbus Tractor Co.
Dart Tractor Co.
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Is Important, But-

To the man who takes care of his own car, the big point is not that Stanweld Rims rank first in years of use and total sales. The facts of outstanding importance to every car owner are:

- 1. There is no other rim on which tire changes are so quickly and easily made.
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THE

STANDARD PARTS

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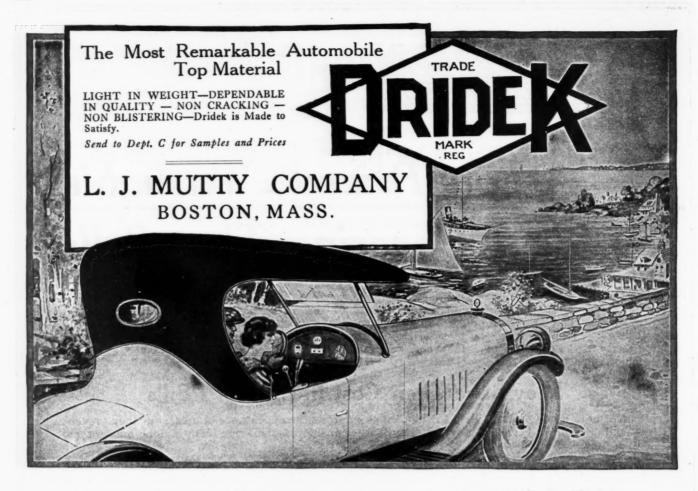
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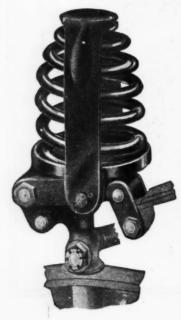
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Repeated blows of heavy reciprocating parts upon crank pins send your crank shaft up for repairs. Their excess weight causes vibration, eats up gas that should be earning greater mileage, slows up your car on grades and causes unnecessary gear shifting.

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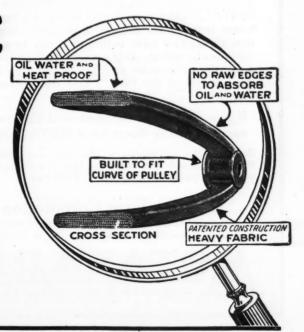
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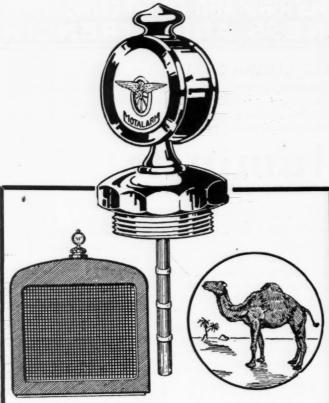
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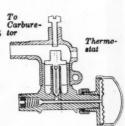
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Long wear can only be proved by long experience. The makers of the Kudson car, for instance, have used

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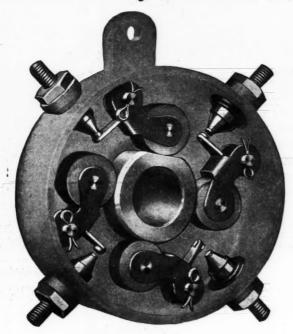
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Of the DUNTLEY MAGNETO BREAK

Performance counts. Here are a few excerpts, picked at random from thousands of letters attesting the excellent performance of the Duntley. The users' statements are unbiased—read them—then judge for yourself.

"Works so much better than I expected."

"I have lived here for 29 years and have a \$10.000 Mail contract, and I carry the mail in a Ford car and it took a timer every 15 or 20 days until I bought your Duntley Magneto Break Timer. I have a daily trip of 50 miles and heavy mails. The country is hilly and full of dust. Your timer works so much better than I ever expected. I enclose money order for four more, as I have orders for that many from friends who have seen what your timer has done for me.

WILLIAM CRIDER.

Bickelton, Washington, July 12, 1919.

"Fulfills every claim."

"Used a Fordson Tractor for 12 months with perfect satisfaction, except the timer, having bought six timers during the year. After beginning to use your timer, we do not know what trouble is. The Duntley absolutely fulfills every claim you make for it. Have used it about six weeks and the tractor has worked like a different machine. Has much more power. Goes almost as fast in intermediate as it did before in high. Would not take five times what we paid for the Duntley."

R. W. BARR & SON.

we paid for the Duntley."

R. W. BARR & SON.

Grassland Stock Farm, Route 4, Gallatin, Tenn.

"I turn her over once and away I go."

"I used to have to crank my head off but I put the Duntley Timer on my Ford and now I turn 'er over once and away I go."

Average III. Inly 14 '19

Aurora, Ill., July 14, '19.

"In regard to the Duntley Timer, I have driven the car about 2.000 miles since I put it on and have forgotten all about the old trouble that I used to have. The snappy contact is easily noticeable, and naturally it gives the motor much more flexibility. There is no other timer for me."

La Porte, Ind., July 14, 1919.

"I recommend is to assert the content of the property of the p

La Porte, Ind., July 14, 1919.

"I recommend it to anyone who wants a timer worth the money."

"I have used the Duntley Timer you sent me, and it simply is a marvel. I am glad I bought it. You could not have it back for ten times the price I paid for it, and I recommend it to anyone wanting a timer worth the money. I am a rural mail carrier, and have given it a test over a thirty-mile route every day from the time I bought it from you. I am proud to own it.

B. L. C. No. 4. Pana. Ill., July 5, 1919.

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Makes the smoothest, cleanest valve and seat surface in less than half the time required by other compounds. Has extraordinary abrasive action. Contains no acids. Unaffected by weather or climate. Used by Service Stations everywhere-exclusively used by largest New York Service Stations.

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IT MAKES ENGINE HANDLING EASILY AND QUICKLY ACCOMPLISHED

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The price of the K & S Universal Engine Stand is \$35. It will pay for itself many times over in time and labor saving.

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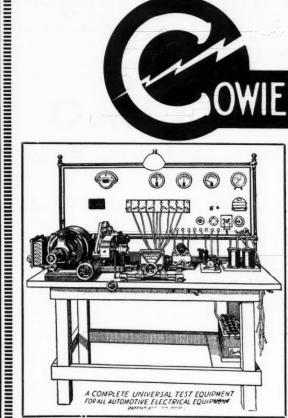
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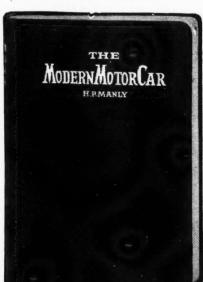
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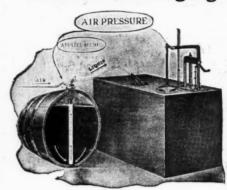
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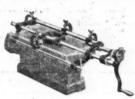


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When a Ford or Fordson motor comes to you for bearing replacements, don't send it away. Order a Universal Main Bearing Replacement Equipment and do the work in your own shop. Universal Equipment will please your Customer. It will save him a long wait, you do the job quickly and you can also do it perfectly. The finished bearings are accurate in diameter, thickness and alignment.

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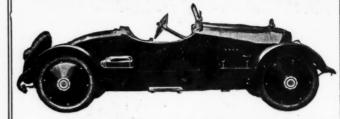
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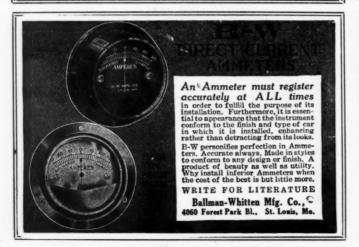
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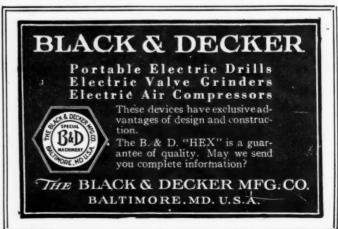
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See our Advertisement next week illustrating Special Features of our Full Line of Road Lamps for 1919 Write for Catalog

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SEE PAGE 5







It protects without damage to itself

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Bumper. It not only protects the car but it absorbs the shocks without any damage to itself. It will not bend or twist out of shape

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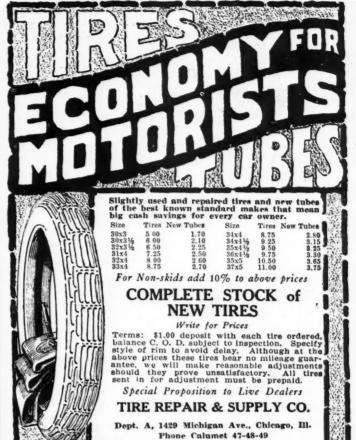
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that absorbs the shock



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Your car's no jazz band. Don't ride to the tune of rattling rods and clattering doors.

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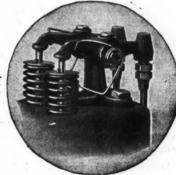
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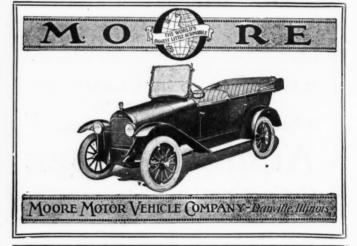
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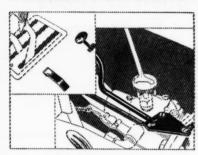
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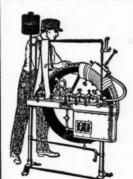
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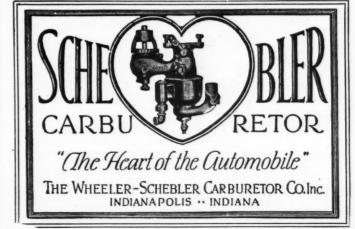
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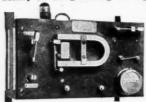
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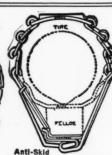
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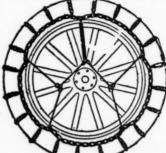
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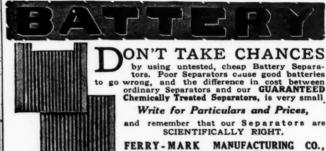


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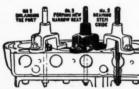




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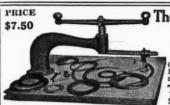
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31x4													7.00	1.0
32x4													7.75	1.0
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33x41/2													9.00	1.
34x4													8.50	1.
													9.00	1.
34x41/2													9.00	1.
35x41/2													9.25	1.
36x41/2													9.50	1.
38x41/2													15.00	2.
40x41/2													15.00	
42x416											_		25.00	4.
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31x4		6.95	5.75	2.50
32x4		7.15	5.65	2.50
33x4		7.80	6.25	2.50
34x4		8.00	6.45	2.50
35x4		8.75	7.15	2.50
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Carter Car 5A-L-R
Chalmers F-K-L & Six 1011M-18-Clark 40
Cadillac 1969-1910
Cameron-Crawford
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Firestone Columbia
Fuller
Ford-N. R. & S.
Creat Northern
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Ilerreshoff-Hupp 20
Illudson 20
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C'smplete Motors, Transmissions and Rear Arles, Money
refunded on all parts within 10 ways if unsatisfactory.

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SPECIAL — Garage and Repairmen — Our new Bulletin of Used Parts and Pr.ces is now ready for you. With this Bulletin in your shop you can supply repair parts for all makes and models of ears listed and increase your repair business. "It is free. Write for it today.

SERVICE—Every inquiry will receive prompt attention. Orders shipped same day received. Satisfaction guaranteed or money refunded.

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Largest Exchange in New England

CUT DOWN H. C. OF L 50% TO 75% By ordering your auto supplies from us.

Because we have saved them money.

New and used parts for most makes of cars at prices so low that you will not believe it possible unless you let us quote you figures.

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INDIANA AUTO PARTS AND TIRE CO.

Indianapolis, Ind.

HAL OWNERS

We can make immediate shipment of any part required in the repair of your Hal motor.

Don't pay a premium for, nor run the risk of using, second-hand parts when you can get NEW PARTS, exact duplicates made from original patterns, by ordering direct from the factory that built your motor.

Deal with headquarters and be assured of good reliable parts at a fair price.

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SAVE 25% TO 75% ON USED PARTS For most makes of cars. Complete motors or parts for same. Gears, Magnetos, Axles, Radiators, Transmissions WE HAVE LARGE STOCK OF BRAND NEW MAXWELL, OVERLAND AND OTHER PARTS AT FOLLOWING PRICES:

Maxwell Rear Springs. \$6.00 Overland Axles—all models. 3.75 Ford Front Springs. 3.00 Studebaker Axle Shafts. 4.50 Maxwell Front Springs. 4.08 Ford Rear Springs. 7.50 Overland Axle Shafts—any model. 4.00 Dodge Axle Shafts—all models. 4.00 Chevrolet Axle Shafts—and I models. 4.00 Chevrolet Axle Shafts—all models. 4.00 Chevrolet Axle Shafts—all models. 4.00 Chevrolet Axle Shafts—and I models. 4.00 Chevrole

We Make Gears

For 150 different makes of automobiles (750 models)

And furnish them when you want them.

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TOP RECOVERINGS BACK AND SIDE CURTAINS SEAT COVERS

For All Cars
SPECIALS FOR FORDS
Complete Roof and Back, Ready to Put On
Roadster \$8.75
Touring 11.60
ONE MAN Touring Tops, complete 36.00
SEAT COVERS Roadster \$6.75 Touring\$11.00
GENERAL OR SPECIAL FORD CATALOG
Sent Free Upon Request
SPECIAL DISCOUNTS TO DEALERS

ATLANTA AUTO TOP AND TRIMMING COMPANY 153 Edgewood Ave., ATLANTA, GEORGIA

PARTS For the Following Cars

USED PARTS AT BARGAIN PRICES

We have a large stock of parts now on hand for immediate shipment. Prompt service and honest methods have built up our business. We guar-antee every part we sell and refund your money if you are not satisfied. Orders shipped same day received.

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One Hundred 8-cylinder motors, 3 in, bore by 41/2 in. stroke. Brand new and block tested. \$100.00 each. New equipment including Atwater Kent distributor and coil, Stewart carburetor, Dyneto Starter and Generator, \$100.00 extra.

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Including Transmission Gears, Differential Gears, Axles, Universal Joints, Clutch Linings and Parts, Cylinder Head Gaskets, etc. Lowest prices consistent with quality and

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CRAIG-HUNT Parts are the safest and BEST COMPLETE SET, for lowering the Ford Frame

\$25.00

We make 16 valve Racing Heads, Racing Bodies,
Pistons and counterbalances for the Ford CRAIG-HUNT, Inc. 910 North Illinois Street, Indianapolis, Ind.

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Model 1915. Every part sold will be guaranteed in excellent condition. Dandy 4-cyl, motor for \$90.00. All other parts.

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Just Write I C Newton's Auto Salvage C R When you are in the market for Anything for the Automobile E E New and Used Gears-Axles-Bearings-etc. Speedster Bodies \$65.00 S Cloverleaf Bodies 233.00 O Touring Bodies 260.00 D FORD-U Write for particulars The Cut Rate B I Accessory Store \mathbf{E} E S 205-11 10th St. Des Moines, Iowa S

RIMS! Firestone Demountable wheels for Fords, \$30.00 per set; 34x4 Firestone, Unv. rims, \$6.50; 34x4½, \$7.00; 36x1½, \$8.00; 36x5, \$8.00. Our slogan is "We have it, we'll get it or it isn't made.

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Three Stores—1741 Woodward Ave., Detroit, Michigan; 1401 N. LaSalle St., Ottawa, Ill. Main Office and Warehouse, 2125 Michigan Ave., Chicago, Ill.

Krit Owners We furnish quick service on all engines, clutch, transmission, differential, front and rear axle, steering gear, wheels, steering knuckles and cones, fenders, frames and body parts—from original Krit stock. For all models from 1900-15, inc.

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1309 Race Street Philadelphia, Pa.

PATTERSON AUTO PARTS WORKS Muskogee, Okla.

"EVERYTHING FOR EVERY CAR" We Sell Cheaper

FIRST CLASS USED MOTORS, \$25 to \$150 Satisfaction Guaranteed. Try Us.

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Pneumatic Tire Wheels for Ford Trucks. Five Detachable Wire Wheels for Fords. Complete Catalogue on Request

CHICAGO WHEEL & RIM CO. 2010 Wabash Avenue CHICAGO, ILL.

Parts and Repairs Tires

cn	-	16		DEL PA	17	and 1
Ande	rson		18	3 Chalmers		1

Satisfaction Guaranteed

AUTO PARTS CO.

I. Wolf Auto Parts & Tire Co.

"A Million Parts"

—35% to 80% Off Manufacturers' Price—
Guaranteed parts for most all models. Send us the old part for duplication, as we absolutely guarantee to return at our expense all parts we can not duplicate.

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\$100 Underslung parts with body free, or parts alone, \$12.50 per set.

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160 DIFFERENT MAKES CARS in PARTS SEND US YOUR OLD PIECES PROMPT ATTENTION

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Be sure all orders and copy are mailed to reach us not later than Friday morning. MOTOR AGE

40% OFF

. 5000 Mile Guaranteed

Standard Brand

TIRES

ARMSTRONG GREY TUBES Guaranteed for One Year

OUR PRICES

Size	Ribbed	Non-Skid	Tube
30x3	\$9.12		\$2.00
30x31/2	11.76	\$12.39	2.45
32x31/2	13.89	14 55	2.55
31x4	18.15	19 05	3.20
32x4	18.48	19 38	3.35
33x4	19.29	20.22	3.45
34x4	19.77	20.73	3.55
35×41/6	27.84	29.16	4.45

 $10\,\%$ deposit required with order, balance C. O. D., subject to examination.

Special proposition to dealers.

The Armstrong Tire Co. 1342-44 Michigan Ave., Chicago, Ill.

Phone Calumet 5212 and 2199

RES & TUBE SLIGHTLY USED AND FACTORY REPAIRED TIRES AND NEW TUBES—QUALITY ABOVE ALL

The QUALITY of our tires and tubes is superlative, the PRICE cannot be equaled and our SERVICE cannot be excelled

A SATISFIED CUSTOMER IS OUR BIGGEST ASSET, THEREFORE. WE MUST SATISFY YOU

	Used	New	Used	New	Used	New
Size	Tire	Tube	Size Tire	Tube	Size Tire	Tube
30x3 .	\$4.00	\$1.95	32x4\$7.25	\$3.05	35x41/2\$8.75	\$4.25
30x31/2.	5.00	2.30	33x4 8.00	3.25	36x4½ 9.00	4.40
32x31/2.	5 50	2.40	34x4 8.00	3.40	35x5 9.75	4.60
34x31/2.	6.00	2.60	35x4 8.25	3.50	36x5 9.75	4.70
31x4 .	6.50	3.70	34x41/2 8.50	4.15	37x510.00	4.75

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly, with privilege of examination, and balance C. O. D. Specify style of rim to avoid delay.

Our Used Tires are not guaranteed for any definite number of miles, but we will make reasonable adjustments on all tires that do not give service in proportion to the price paid, providing tires are returned to us by prepaid express. Is not this fair enough?

WE CARRY A COMPLETE STOCK OF NEW TIRES-WRITE FOR PRICES.

LINCOLNTIRE&SUPPLY CO.

1463 South Michigan Avenue, Dept. 1. CHICAGO, ILLINOIS

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JOB LOTS

Obsolete, Surplus Stocks and **Factory Seconds** WRITE-CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

TIRES AND TUBES

SLIGHTLY USED TIRES

OBTAINED FROM WRECKED CARS AND

			CICIL	TOTAL CALIFIC	L)	
Size	7	ires	Tubes	34x41/2	9.00	1.75
30x3	\$	4.50	\$1.35	35x4 1/2	9.25	1.80
30x3 1/2		5.50	1.45	36x4 1/2	9.50	1.85
32x31/2		6.00	1.50	38x41/2	15.00	2.50
31x4		7.00	1.65	40x41/2	15.00	
32x4.:		7.75	1.60	42x41/2	25.00	4.00
33x4		8.50	1.70	35x5	10.25	2.00
34x4		8.50		36x5		2.00

NEW TIRES

| NEW TIRES | NEW, FRESH STOCK | Exceptional Bargains | Size Tubes | S

35x4... 9.00 1.75 37x5... 10.75 2.20 34x4... 18.10 3.10 37x5... 30.7 33x4½.. 9.00 1.75 38x5½... \$15.00 ADD 10% FOR NON-SKID \$1.00 Deposit Required With Each Tire Ordered, Balance C. O. D., Subject to Examination. Specify Style of Rim.

AUTO NEEDS COMPANY

1602 Michigan Ave. Chicago, Ill.

Tires

Tires Rebuilding and Repairing

Good News!

This Substantial Reduction Is Your Gain

> Compare Our Prices Then Order

QUALITY COUNTS

New	F_1	76	e	8	h	i	S	t	0	ck,	L	18	S	ort	e	l	B	ra	m	ds	
										Ne	W			Us	ed			Ne	w		
Siz	e									Tir	es			Ti	es		T	ul	es		
28x	3								.\$	7.8	80.		5	š				\$1.	75		
30x										7.6											
30x	31/2									9.8	80.			6	.00).		2.	10		
32x	31/2									11.5	55.			7	.50)		2.	20		
34x	31/2						Ī	ï		13.4	15.			8	.00).		2.	55		
31x	4									15.	15.			8							
323	4									15	10.			8	.50).		2.	75		
33x	4									16.	10.			9	.00).		2.	85		
343	4									16.	50.			10	. 00).		2.	90		
353	4									18.	75.			10	.00).		3.	30		
363	4									19.3	30			10	.50).		3.	40		
333	41/2									21.	15.			10	.50).		3.	45		
										22.									55		
357	41/2									23	20			11	.0	0.		3.	65		
363	41/2									23.	55.			11	.50).		3.	75		
375	41/2									26	95			11	.5	0.		4.	30		
	5									29.											
	15									29.	90			13	.0	0.		4.	.85		

30.75 13.00 4.55 30.75 13.50 4.55 Add 10% for Non-Skid Cases or Red Tubes, Special Prices to Dealers—Let Us Know Your Wants.

MAIL ORDERS SOLICITED

10% Deposit Required with Order, Balance C. O. D., Subject to Your Examination and Approval.

SERLIN TIRE CO.

Incorporated
1300-1302 Michigan Ave., Chic
PHONES: CALUMET 3407-3408 Chicago, Ill.

No Deposit Required ON OUR TIRES

Demonstrating

All Non-Skid TIRES

They Are MUCH BETTER Than the Ordinary Used Tires

24.07	K - 2 - 2 - 1				
Size	Tire	Tube	Size	Tire	Tube
30x3	\$ 6.50	\$1.75	33x41/2	\$13.50	\$2.50
30x31/4	7.50	1.90	34x4½	13.50	2.60
31x31/2	8.00	1.95	35x41/2		2.65
32x31/2	9.00	2.00	36x41/2	15.00	2.75
31x4	9.50	2.15	38x41/2	22.00	
32x4	10.50	2.15	35x5	15.50	2.85
33x4	11.50	2.25	37	16.50	2.95
34x4	12.50	2.35	37x5½	18.00	
32x41/2		2.35	38x5½		

5% Off for Cash in Full with Order. Otherwise, goods shipped C. O. D., subject to examination. Specify whether clincher or straight side

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CHICAGO, ILL.

Special Bargains in

SLIGHTLY USED TIRES

The Kind That Will Satisfy All Customers 30x3 ... \$4.50 32x4 ... \$7.75 35x4½ ... \$9.25 30x3½ ... 5.50 33x4 ... 8.50 30x4½ ... 9.50 31x3½ ... 5.75 34x4 ... 8.50 37x4½ ... 9.50 31x3½ ... 5.75 34x4 ... 8.50 37x4½ ... 10.00 32x3½ ... 6.00 35x4 ... 8.75 35x5 ... 10.25 34x3½ ... 7.00 36x4 ... 8.75 36x5 ... 10.25 31x4 ... 7.00 34x4½ ... 9.00 37x5 ... 10.75 Send \$1.00 deposit with each tire ordered. Balance C. O. D., subject to examination. Specify if Clincher, Q. D., or Straight Side.

American Tire & Vulcanizing Co.
Phone: Calumet 5170 2136 S. MICHIGAN AVE., CHICAGO, ILL.

Good Double Tread Tires, All Sizes Guaranteed 3000 Miles

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RETREADED AUTO TIRES Are highly serviceable if cured in the proper mold. In buying your new mold be sure that it has:

FIVE CLAMPS. Less clamps can not give the

proper pressure.

WATER GAUGE. To know at all times you are curing with steam.

One that you can rely upon.

STEAM GAUGE. That registers accurately.

FLANGE. On each end of mold to prevent overflow.

RASE. That is one piece and strong enough to carry mold.

mold.

MACHINE FINISH. A retread mold must be of sufficient weight to hold heat, and be machined to a smooth finish.

THIRD CIRCLE. Not called a third and only

THIRD CIRCLE. Not called a third and only measure a quarter.
UNIT PLAN. Each mold should be separate and independent of the other to insure easy working.
THE CRESCENT RETREAD TIRE MOLD is the only mold sold today embodying all of these features.
Write for our new catalogue, it explains it all.

CRESCENT MACHINE COMPANY
Office and Factories
Hill and Forge St. Akron, Ohio

SUPERB DOUBLE TREAD TIRES selling at one-fourth the wateriel and elling at one-fourth the usual tire cost you of their quality material and and an and are GUARANTEED 4,000 MILES. so carry a complete slock of New Tibes

Are selling at one-fourth the usual tire cost to convince you of their quality material and "orkmanship, and are GUARANTEED 4,000 MILES. We also carry a compete s.o.ck of New T.i.ces at factory prices.

Size. Tire. Tube. Size. Tire. Tube. 30x3 \$4.85 \$1.65 36x4 \$9.50 \$2.45 30x3½ 5.85 1.70 34x4½ 9.60 2.50 32x3½ 6.35 1.80 35x4½ 9.60 2.50 32x3½ 6.35 1.80 35x4½ 10.35 2.50 34x3½ 7.50 1.90 30x1½ 10.35 2.50 31x4 7.60 2.20 35x5 11.10 2.50 32x4 7.60 2.20 35x5 11.10 2.50 32x4 7.85 2.25 30x5 11.25 2.60 34x4 8.10 2.35 37x5 11.60 2.60 35x4 8.50 2.40 RELINER FREE WITH EVERY TIRE When ordering state whe.her you want straight side or clincher, plain or non-skid. Send \$1.00 deposit for each tire ordered, balance C. D. subject to examination. We allow a special discount of 5% if you send the full amount with the order.

SUPERB TIRE & RUBBER CO. 2549 Indiana Ave. - - Chicago

REAL VALUES HIGH GRADE NEW TUBES AND TIRES

Some PRICES on NEW TIRES and Tubes

Size	Plain	Non-Skid	New Tubes
30x3	\$ 7.55	\$ 8.90	\$1.70
30x3½	9.75	10.85	2.10
32x3½	11.35	13.10	2.25
31x4		16.80	2.60
32x4	15.15	16.95	2.75
33x4	15.95	17.85	2.85
24x4	16.25	18.40	2.95
10% deposi	t required		
C. O.	D., priviles	ze examinati	on.

Carl G. Wiesenmeyer "The Tire King" Springfield, Ill.

CORD & FABRIC TIRES

We carry the Largest Stock of all Standard Makes of Guaranteed Tires in the State. We can offer you a saving on Solid and Pneumatic Tires.

May We Quote You Prices?

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AUTOMOBILE DEALERS

Etc. Sell Double Tread Tires and Make Real Money. Write us for proposition.

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Dept. M 126 E. 33d St. Chicago, Ill.

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I s. s. Clincher and Q. D. Tires, Plain or NonSkid Tires. Cord Tires, Fabric Tires. New or
R Used Tires. All kinds—all makes.
GRAY'S AUTO GARAGE CO.
E 3212-3214 Brighton Road, N. S., Pittsbugh, Pa.
E TIRE SPECIALISTS
LISED TIPES R USED TIRES

TIRES—SLIGHTLY USED

30x3½, \$5.00; 31x4 and 32x4, \$6.50 each; 33x4 and 34x4, \$7.00 each; 34x4½ and 35x4½, \$8.50 each; all NONSKID. Standard makes. 20 per cent deposit required on C. O. D. order. Big saving on all other sizes and tubes also. State size and bead of tire. Orders filled same day received.

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REGROUND **CYLINDERS**

Are Guaranteed. When your cylinders are returned to you, after regrinding in our factory, they are correct.

That is why we guarantee that, if for any reason at all, you find them unsatisfactory, you may simply return the new pistons to us, and we will refund your money without quibble.

We have the highest grade of labor, and a perfectly maintained battery of Heald grinding machines, which makes this guarantee possible. Does it appeal to you?

Write us. Send your work.

NEUPERT MFG. CO.

82 Lark St. Buffalo, N. Y.

CYLINDER

CRANKSHAFT **GRINDING**

We offer you the services of expert mechanics, modern high grade equipment, and years of experience in this business.

Our special Light Alloy and Grey Iron Pistons insure more power and speed because of extreme accuracy and extra lightness.

Satisfaction and prompt deliveries
WRITE TO US

We also do spur and bevel gear cutting

Auto Engine Works

St. Paul, Minn.

Rebuilding and Repairing

Rebuilding and Repairing

Why Green Process Cylinder Grinding Exceeds Your Expectations

Others regard our big plant as a serious business. It might be so to us if cylinder grinding weren't our hobby. To men with a sensitive sixth sense—trained in the shops of the great automobile manufacturers—trained to detect even the slightest irregularity of a seemingly sound motor—to such men, cylinder grinding by the Green Process means opportunities to exercise their special knowledge—just as a great physician delights to convert sickness into health.

They possess, too, the advantages that specially designed cylinder grinding machinery brings to the skilled workmen. With Brown & Sharpe machines cylinder diameter does not vary more than .0005 of an inch and each hole squares true with the cylinder base.

And of pistons, rings, pins, bearings, and in fact all parts for all cars, trucks and tractors, there is no end to the variety of sizes and designs carried in stock.

Small wonder that you can rely upon the Green Process of cylinder grinding to deliver work guaranteed to equal or exceed original factory efficiency.

You may need the Green Book right now—send for it today so that you may know what others think of Green service.

Some Famous Products of GREEN Manufacture Aluminite Pistons—Aluminite Connecting Rods—Power Plus Cylinder Heads for Ford Cars

Look for our Display Advertisement in this issue

GREEN ENGINEERING COMPANY

DAYTON, OHIO

Attention

CAR OWNERS

Winter driving demands strong engines. Why not give that trouble a knockout punch by having the

Cylinders Reground
AND EQUIPPED WITH NEW
PISTONS, PINS and RINGS

BUTLER MFG. CO.

Cylinders Reground

Scored or cracked cylinders welded. Oversize Pistons and Rings furnished.

Emerson Manufacturing Co. 1075 Gratiot Ave. Detroit, Michigan

Have Your Cylinders Reground Here

Our skilled workmanship assures you a powerful, efficient, smooth-running and economical motor. We supply perfectly fitting Pistons and Rings. All standard piston rings in stock. All work fully guaranteed. Prompt delivery a feature. Special rates to Repair Men.

Bridgeport Piston Ring Company Third St. & Conn. Ave., Bridgeport, Conn.

THE LARGEST PLANT IN THE U.S.

AND THE BEST EQUIPPED—SPECIALIZING ON
crank shaft regrinding, cylinder regriading and repairing of scored cylinders, is at you: service. We do not file and lap crank shafts but grind them on special machines.
We have a battery of machines for cylinder regrinding and use the famous Eagle pro ess for scored cylinders. We also shrink starter steel ring gears on fly-wheels.

NO WAITING FOR WEEKS-QUICK SERVICE—ABSOLUTE SATISFACTION
A TRIAL IS MOST CONVINCING—SHOOT 'EM IN

STAFFORD MOTOR CAR COMPANY

KANSAS CITY, MO.

ARE YOU ACQUAINTED with the Heald No. 60, built expressly for regrinding cylinders? Write for Heald's Blue Border Bulletins, Series No. 6, about what others who have done this work think of this machine.

THE HEALD MACHINE CO.

Worcester, Mass.

HAVE

SCORED CYLINDERS

REPAIKED BY THE

EAGLE Patented PROCESS We do not heat the cylinder or enlarge the bore, thereby saving the expense of new pistons, rings and pins.

SHIP YOUR WORK TO NEAREST ADDRESS

For territory rights write to

Eagle Machine Co., 24 N. Nob'e St., Indianapolis, Ind.
Detroit Auto Machine Co., 1682 Gratiot Ave., Detroit, Mich.
Stafford Motor Car Co., 22nd and Campbell St., Kansas City, Mo

Litter Motor Machine Co., 240 N. 4th St., Columbus, Ohio. Trindi Machine Works, 57-61 E. 24th St., Chicago, III Gladish Machine Works, 50P Broad St., Chattancoga, Tenn. For territory rights write to EAGLE MACHINE CO., Indianapolis, Ind.

SCORED CYLINDERS

REPAIRED BY THE ONLY SUCCESSFUL PROCESS

LAWRENCE PATENT PROCESS

SEE our display adv. In this issue for list of plants where to ship cylinders

CYLINDERS

Rebored

ERIC J. GUSTAFSON 413-415-417 Winnebago St. ROCKFORD, ILL. Rebuilding and Repairing

Rebuilding and Repairing

PHONE COLISEUM 7533

Trindl Machine Works 57-61 East 24th Street Street

OUALITY **SERVICE**

PISTONS—PISTON RINGS—WRIST PIN3 CYLINDER GRINDING SCORED CYLINDERS REPAIRED CRANK SHAFT GRINDING

Rebuilding and Repairing Magnetos and Service Stations

CYLINDERS REGROUND

Best equipment and expert mechanics mean high class work—our kind. Special attention given to tractor work. Yes—we duplicate given to tractor work. Yes—we dupliparts and do welding. Prompt service.

McDONALD AUTO PARTS

St. Marys, Ohio

CYLINDER GRINDING TO KANSAS CITY SEND YOUR

We have a fine plant, equipped with the most modern facilities for cylinder grinding and fitting of pistons and wrist pins. Our workmen are experts. All jobs inspected before shipping.

1505 MeGee Street

QUICK SERVICE AND ATTRACTIVE PRICES TO GARAGE AND REPAIR MEN
ee Street HARRY LEE MACHINE WORKS Kansa

Kansas City, Mo.

EXPERT REBORING

of Cylinders and Welding of Broken Parts constitutes our main business. On badly scored cylinders we use old pistons by putting sleeve in cylinder. We maintain one of the largest and best equipped plants in the West for this work. Try us for real satisfaction.

STANDARD WELDING & MACHINE CO.

CYLINDER GRINDING

Try us for this work. Our shop is large and well equipped. We weld any part and any metal. Expert work and quick service.

MIDLAND MACHINE WORKS
Muskogee, Okla,

We also shrink on STARTER STEEL RING GEARS

Send it to-HARTFORD Cylinders Reground

Pistons and Rings accurately fitted. Best equipped plant in New England. Prompt Delivery.

Charter Oak Machine Co. 438 Asylum St.

HARTFORD

CONN.

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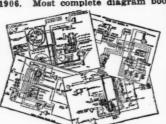
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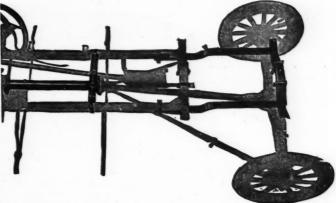
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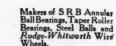


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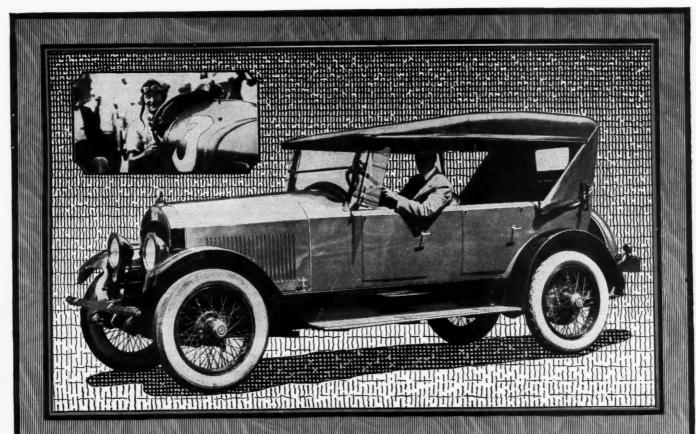
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